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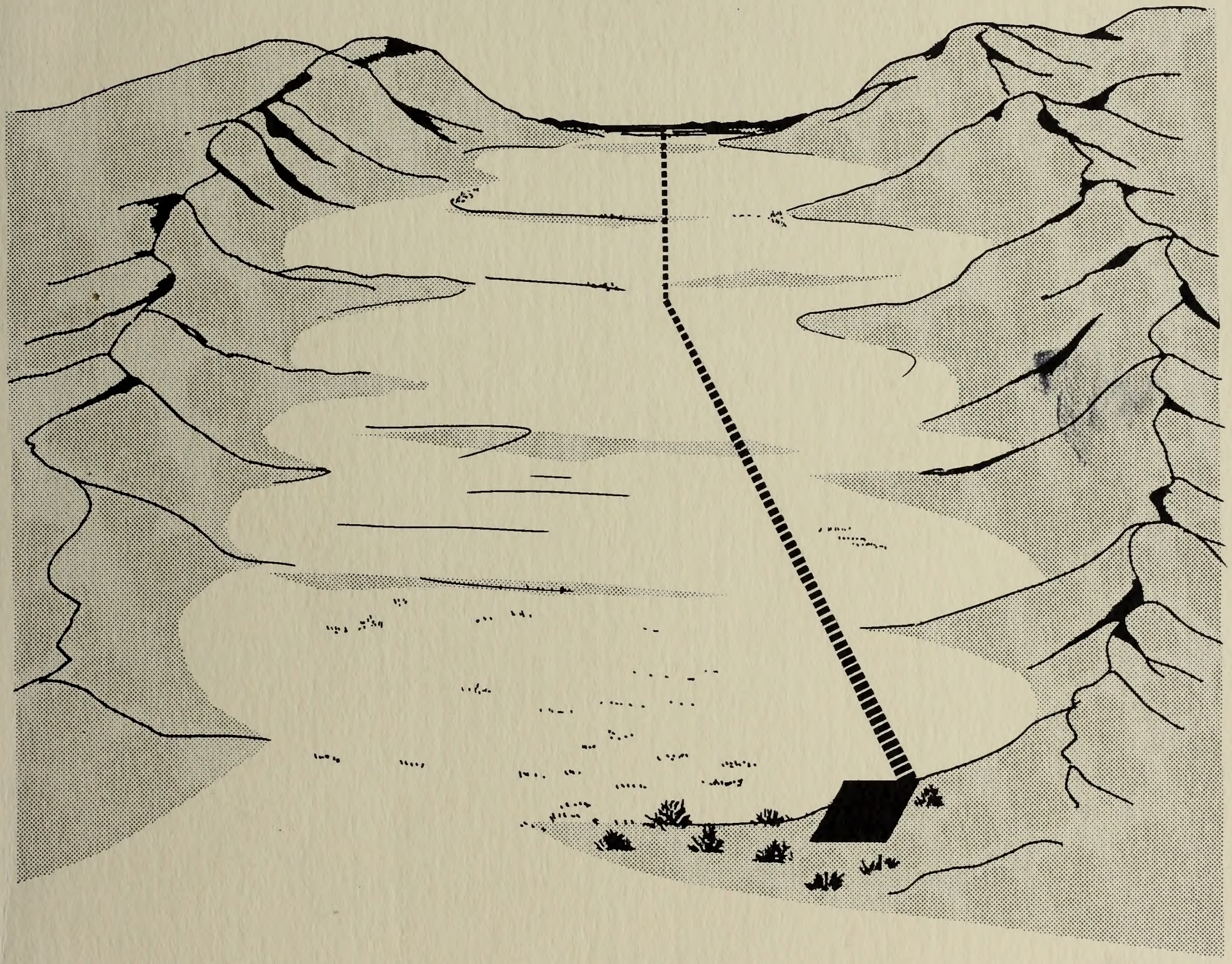
ENVIRONMENTAL IMPACT STATEMENT ANACONDA NEVADA MOLY PROJECT



U. S. DEPARTMENT OF THE INTERIOR

Bureau of Land Management

ANACONDA NEVADA MOLY PROJECT
HEARING REGISTRATION CARD

NAME & TITLE OF PERSON SPEAKING: ______________________________

____

ADDRESS: ____

COMPANY, GROUP, ASSOCIATION REPRESENTED: ________________

____

PLEASE NOTE ANY TIME CONSTRAINTS: _____________________

____

PLEASE IDENTIFY TIME AND LOCATION YOU WILL BE SPEAKING AT:

May 13, 1980 - Tonopah, Nevada ____
May 14, 1980 - Austin, Nevada ____

NOTE: Witnesses are encouraged to keep their oral testimony concise and addressed to their specific points of interest in the proceedings (maximum of 10 minutes).

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ENVIRONMENTAL IMPACT STATEMENT
ANACONDA NEVADA MOLY PROJECT

Lead Agency

U.S. Department of Interior
Bureau of Land Management
Nevada State Office
P.O. Box 12000
Reno, Nevada 89520

For Further Information Contact

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Location of Action

State of Nevada
Counties of Lander and Nye

ABSTRACT

This Draft Environmental Impact Statement is in response to a right-of-way application for a 230kv transmission line submitted to the BLM by Sierra Pacific Power Company. The proposed transmission line would cross public land administered by the Bureau of Land Management, Battle Mountain District, and would supply electric power to the site of the proposed Anaconda Nevada Moly Project. This project would consist of an open pit mine and flotation mill plant designed for the production of molybdenum concentrate. This document addresses both the mine/mill site and the proposed transmission line corridor; however, the right-of-way application is the only action over which the BLM has permitting authority.

Comments regarding this Draft Environmental Impact Statement must be received by the BLM, Nevada State Office by JUN 02 1980.

Edward F. Spang

State Director
Nevada State Office
Bureau of Land Management

NOTICE OF PUBLIC REVIEW PERIOD
ANACONDA COPPER NEVADA MOLY PROJECT
DRAFT ENVIRONMENTAL IMPACT STATEMENT
(DEIS)

Public hearings concerning the DEIS Anaconda Copper Company Nevada Moly Project have been scheduled at the following locations:

Tonopah, Nevada
May 13, 1980
7:30 p.m.
Tonopah Convention Center

and

Austin, Nevada
May 14, 1980
7:30 p.m.
Austin Senior Citizens Center

The purpose of the hearings is to give the public an opportunity to pass judgement on the adequacy and accuracy of the analysis set forth in the EIS draft. Testimony presented at these hearings will be used in revising the draft.

Persons or organizations wishing to give oral testimony will be limited to 10 minutes, with written submissions invited. Prior to the hearing individuals or spokesmen are requested to complete and send the hearing registration form provided with each draft EIS to the Bureau of Land Management (BLM) Nevada State Office.

Written comments on the draft EIS should be submitted by June 2, 1980 to Ed Spang, Nevada State Director (N-921), BLM, 300 Booth Street, P.O. Box 12000, Reno, Nevada 89520.

Comments received on the draft EIS, whether written or oral, will be given equal consideration during preparation of the final EIS on the Anaconda Copper Company Nevada Moly Project. The final EIS is scheduled for public availability in September 1980.

SUMMARY

Project Summary

The proposed Nevada Moly Project would be constructed near Tonopah, Nevada, and would include an open pit molybdenum mine and mill, and a 230 kilovolt (kv) electric transmission line. The mine and mill would be located on a combination of Anaconda Copper Company's (ACC) privately owned land and public land on which the company has located mining claims under the general mining laws. The proposed transmission line would be located on public lands managed by the Bureau of Land Management (BLM), Battle Mountain District. The proposed transmission line would be constructed by Sierra Pacific Power Company (SPPCo) and would run along the east side of the Big Smoky Valley from an existing transmission line near Austin, Nevada, to ACC's property located approximately 18 miles north of Tonopah, Nevada.

Under the plan of operation for the project, the proposed open pit molybdenum mine.and flotation mill would require removial from the pit of 80,000 metric tons of waste and 20,000 metric tons of ore per day. The ore would be crushed, ground, and subjected to a flotation recovery process from which the molybdenum concentrate produced would be dried and placed in drums for shipment to market. Mine waste would be stored near the pit; tailings from the mill would be placed in a pond located on the site. Water for the process would be pumped from wells and also reclaimed from the tailings pond. The project would require a total of 400 employees when operational. Electrical power requirements for the mine and mill are estimated to be 30 megawatts.

The right-of-way application from SPPCo for the construction of the transmission line is the only action over which the BLM has any permitting authority. The BLM has no authority over any aspect of the construction or operation of the molybdenum operation. However, it was concluded that the definition of the Proposed Action should also include the mining operation because the mining operation and transmission line are closely related and connected actions and because it was anticipated that cumulative impacts for the right-of-way and mining project would be significant.

Environmental Impact Statement (EIS) Scoping Process

Following the decision to prepare an EIS, the BLM initiated a "scoping process" to determine the scope and significant issues to be analyzed in depth in the EIS. The final scoping document used in the process identified the significant and non-significant issues determined by BLM (Table 1).

Scoping information for the EIS was gathered in the course of meetings, briefings, and direct contact with the interested groups, agencies and individuals. During the scoping process, 31 public inquiries were received. Several were specific and useful concerning the proposals, while others were requests for additional information.

The public identified several items as significant issues (Table 2). Some issues were in addition to those previously identified in the draft scoping document. Each issue was addressed in the final scoping document and the EIS process included consideration of all issues. It was determined that if the issues were found to be significantly impacted by the Proposed Action or alternatives, they would be documented in the EIS.

The major issues identified in the scoping process are as follows:

1. *Electrical Power for Kingston Canyon Residents*. One issue which was raised by several people concerned the issue of tapping the proposed transmission line for the purpose of supplying local power. It was concluded that this issue did not relate to the primary proposal to an extent necessary to be considered as an alternative. A contractual agreement between SPPCo and the residents of the Kingston Canyon region to tap the proposed 230kv transmission line and supply electrical power to local residents had not occurred by the end of the scoping process. Therefore, the cumulative impacts of providing electric service to the Kingston Canyon region were not considered in the EIS.
2. *Ft. Churchill Routing For Transmission Line*. During the scoping process it was suggested that an alternative routing be considered from the Ft. Churchill generating station near Yearington south to Walker Lake, then to the Millers substation and north to the Anaconda property. This alternative was subsequently analyzed in the preliminary stages of the EIS process to determine if it could be considered a reasonable alternative as defined under Section 1502 14(a) of the National Environmental Policy Act (NEPA) regulations. An environmental analysis concluded that the Fort Churchill alternative was not a reasonable alternative and should not be analyzed in detail in the EIS (see Chapter 1 for additional information).

3. *Use Existing Multiple Utility Corridors.* One issue identified in the scoping process was that a wilderness inventory area at the north end of the Big Smoky Valley could be protected if the transmission line would follow the route of existing telephone lines on the west side of the Big Smoky Valley along Highway 376. It was also felt that this would be preferable from a construction and maintenance standpoint. An accelerated wilderness inventory concluded that the area in question does not have wilderness character. However, the West Smoky Valley Corridor was included as Alternative 1 in the EIS and analyzed in detail. It was concluded that the West Smoky Valley alternative corridor would have greater impacts to the visual and cultural resources of the Big Smoky Valley than the proposed transmission line (refer to Chapter 3 for additional discussion). In addition, the West Smoky Valley alternative corridor would present several potential conflicts with private land users.

Summary of Impacts and Issues to be Resolved

If the Proposed Action or alternatives are approved and developed, both beneficial and adverse impacts would be experienced in Nye County and Tonopah. A summary table of the specific impacts for the Proposed Action and alternatives can be found in Chapter 1 and an expanded discussion of the impacts can be found in Chapter 3. However, there are several major issues and impacts associated with the Proposed Action and alternatives that need to be stressed. These are generally summarized as follows:

1. *Socioeconomic Issues.* The construction of the ACC mine/mill complex would have significant direct and indirect beneficial and adverse impacts on Tonopah and Nye County. The project would beneficially affect the regional economy of Nye County and the city of Tonopah. The project would generate approximately $1.7 million annually in tax revenues for the city of Tonopah. The construction payroll would exceed $26 million and the annual operating payroll would amount to $8 million.

   However, associated with the beneficial impacts, there would be several significant adverse socioeconomic impacts. Most of the adverse impacts are directly or indirectly associated with increase in population and services required to support the influx of project-related personnel. The impacts are addressed in Chapter 3 but generally consist of the following:

   - *Employment and Income* - Project abandonment in 2001 would result in elimination of approximately 1,000 jobs (both at the mine/mill and in the service sector) and the labor force would migrate from the Tonopah area.
   - *Public Financial Resources* - There would be a short-term adverse impact resulting from the time lag between influx of population, and the generation of new revenue to support the associated increase in public expenditure needed as a result of the project.
   - *Attitudes and Lifestyles* - Some existing residents would be adversly affected because a disruption of lifestyle would occur due to influx of new residents with different values, mores, and attitudes.
   - *Housing* - Extremely high housing demands associated with the Proposed Action, the limited ability of the local market to expand its housing stock, and an already tight housing market would create short-term adverse impacts on housing. The peak housing demand would be around 951 dwelling units by 1981. Estimated supplies would provide approximately 198 units, resulting in a shortage of 753 units. Therefore, unless housing is provided prior to the time when it is needed, the shortage of housing would be an unavoidable adverse impact and could limit the expansion of the work force, delaying the construction of the project.
   - *Schools* - Schools would be adversly impacted during the first two to three years of the project, until new permanent facilities could be built. Current physical capacity would be exceeded by over 85 percent during the 1980-81 school year. An additional 22 classrooms and teachers would be required. The cost of the additional facilities and staff would be an unavoidable adverse impact. The extremely rapid enrollment growth would be offset to some extent by the school district's ability to respond fairly rapidly to increases in operating expenses; however, the lag associated with property tax revenue and the time required for capital

facilities construction would result in serious short-term problems.

- *Health Services* - Health services would be directly affected by an increased need for staff. Trained medical personnel are difficult to attract to Tonopah. Therefore, any unfilled positions would indirectly translate into a reduced provision of health care services.
- *Water Supply, Wastewater Treatment, Solid Waste* - The project-related growth would cause unavoidable adverse impacts to the town of Tonopah's water supply system, wastewater treatment facilities, and solid waste disposal facility. Each of these facilities would require expansion of its capacity at some time during the project life to accommodate the project-related growth. The most significant impact involves the wastewater treatment system which must be improved to meet future growth needs without the Proposed Action. Failure to provide substantial increases in capacity could either delay the project schedule or require provision of treatment facilities for the residential development area planned by Anaconda.
- *Social Service Programs* - Some minor, short-term adverse impacts to social service programs, e.g., increased caseloads and additional resource staff requirements, would be anticipated as a result of the Proposed Action. The impacts would be greatest during the construction period.

2. *Revegetation Success at Mine/Mill Complex.* Since there are uncertainties regarding eventual reclamation plans, particularly with regard to the characteristics of tailings and waste disposal areas to be revegetated, a worst-case analysis was necessary. Assuming that these areas would not provide suitable plant growth media, it was concluded that insufficient soil material would be available for use in revegetation. Poor water-holding capacity and high erodibility would limit revegetation potential which led to the conclusion that revegetation failure would occur. The lack of vegetation on waste disposal areas, the tailings dam and, tailings pond would significantly affect the long-term visual resources af the project area.

3. *Comparison of Impacts for Alternatives.* Four alternatives to the Proposed Action have been analyzed in detail. These include the West Smoky Valley alternative corridor; alternative transmission tower structures; an alternative crushing and grinding circuit for the mine/mill complex; and the No Action alternative which would consist of development of the mine/mill with on-site generators. Chapter 1 includes a detailed summary of alternatives, but the major environmental differences between the alternatives and Proposed Action are as follows:

- *Alternative 1, West Smoky Valley Alternative* - A significant number of cultural and historical sites would be adversely affected by this alternative. In addition, construction of a transmission line on the west side and portions of the east side of Highway 376 would adversely affect the high scenic quality (Class II) of the Toiyabe Mountains to the west of the highway. Additionally, land use conflicts with private landowners would result from construction of the West Smoky Valley Alternative.
- *Alternative 2, Alternative Tower Structures* - Four alternative tower structures were analyzed for construction of the tramsmission line. Impacts were analyzed for both the proposed and West Smoky Valley Alternative corridor. Use of the different structures would not affect impacts for most environmental components, but would change impacts to visual resources. One of the alternative structures would result in impacts identical to the proposed structure. The remaining three structures would result in reduced impacts, in comparison to the proposed structures, because their colors would be in greater harmony with the natural tans and grays of the existing landscape.
- *Alternative 3, Alternative Crushing Grinding Circuit for Mine/Mill Complex*- This alternative would result in a significant increase of total suspended particulates (TSP) over the Proposed Action. In addition, annual average and maximum TSP concentrations would be significantly higher but would still not exceed Federal or state air quality standards. This alternative would require an additional 18 employees which would increase the population projections by 101. The increases in population would also create an additional housing demand of 33 dwelling units.

- *Alternative 4, No Action* - This alternative assumes that construction of the mine/mill would be completed without the transmission line and that Anaconda would develop on-site diesel generators for the power source. Therefore, all impacts associated with the Proposed Action would be the same except that impacts identified for the transmission line would be eliminated. However, with the diesel generators, there would be additional TSP and pollutant (SO_2, NO_x and CO) emissions. The generators would result in an increase in particulate emmisions (55.6 tons per year), but the resulting TSP concentration would still be below state and Federal air quality standards. There would be pollutant emmissions of CO, NO_x and SO_2, but the concentrations would not exceed any Federal or state standards. This alternative would require an additional 6,570,000 gallons of diesel fuel annually.

TABLE 1

FINAL IDENTIFICATION OF SIGNIFICANT ISSUES

Significant Issues[1]

Cultural Resources	Social Impacts	Solid Waste Disposal
Air Quality	Economics	Wildlife
Threatened/Endangered Plants & Animals	Water Use	Transportation
Visual Resources	Aquifer Contamination	Noise
Wilderness	Mine Waste Disposal	Agriculture

Non-Significant Issues

Geological Hazards
Livestock Grazing
Wild Horses and Burros
Woodland Products

[1]Some issues were identified as significant because the impacts were unknown.

TABLE 2

ISSUES IDENTIFIED DURING EIS SCOPING PROCESS

- Ft. Churchill transmission line alternate routing
- Use of existing multiple utility corridors (Highway 376) for transmission line
- Potential alternate sources of power
- Electrical power supply to residents of Kingston Canyon
- Use of wooden poles for transmission line construction
- Impact of Proposed Action and Alternative on the Arc Dome Wilderness area
- Impact of Proposed Action and Alternative on visual resources
- Identification of planned mining operations which might tap a potential transmission line through the Great Smoky Valley
- Identification of three sage grouse strutting grounds on the project area
- Plants on the proposed threatened and endangered list that are found in the Big Smoky Valley
- Cultural and historic resources potentially located in the project area

PURPOSE AND NEED

This Environmental Impact Statement (EIS) describes the components of, alternatives to, and environmental consequences of implementing the proposed Anaconda Nevada Moly Project. The Nevada Moly Project includes a proposed open pit molybdenum mine, an ore processing plant, and a 230 kilovolt (kv) electric transmission line. The mine and mill would be located on a combination of Anaconda Copper Company's privately owned land and public land on which the Company has located mining claims under the general mining laws. The mining laws permit use of the claims for mining and milling purposes as if they were private land. The transmission line would be located on public lands managed by the Bureau of Land Management, Battle Mountain District.

The purpose of the Proposed Action is to develop an open pit mine and mill plant for the extraction and processing of molybdenum ore. The facility would process 7.5 million tons of ore per year over a 20-year productive life. The products, molybdenite concentrate (MoS_2) and a copper concentrate by-product, would be shipped by truck to rail transportation centers in Reno, Nevada. From Reno, the product would be shipped to unspecified markets throughout the United States.

The objectives of the Proposed Action are to supply molybdenum concentrate to various industrial markets in the United States. The product can be used, as is, in various industrial processes or can be converted to molybdic oxide (MoO_3) or several other consumer products. The end uses of these products include: (1) chemical uses such as extreme pressure greases; industrial gear oils; catalysts used in petroleum processing and coal gasification; and corrosion inhibitors; and (2) metallurgical uses as additives which increase the strength and corrosion resistance of stainless steel, high strength steel, high temperature steel, and other metal alloys. Metallurgical uses are the most prominent use in the United States where molybdenum-containing alloys are used to build such products as steam turbines and gas scrubbers (stainless steel); pipelines, well casings, and automobile bodies (high strength steels); and petroleum refining and power generation facilities (elevated temperature steels).

The National Environmental Policy Act (NEPA) is our basic national charter for protection of the environment. Section 102(2)(C) of NEPA requires that an EIS be prepared on any major Federal action significantly affecting the human environment. The decision was made that this project meets that criteria. The primary purpose of this EIS is to provide an objective evaluation of the environmental impacts associated with the Proposed Action and alternatives in order to meet the requirements of NEPA and ultimately, better decision making. This EIS provides a discussion of significant environmental impacts and informs decisionmakers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment.

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CHAPTER 1

ALTERNATIVES INCLUDING THE PROPOSED ACTION

BACKGROUND

The Anaconda Copper Company (ACC) of Denver, Colorado, is actively involved in mining and refining mineral resources in many states throughout the United States and abroad. In 1955, ACC acquired approximately 9,000 acres of land in Nye County, Nevada, in order to evaluate the feasibility of developing molybdenum and copper deposits on the property. The area is located approximately 18 miles northwest of the town of Tonopah. Since 1955, ACC has intermittently conducted exploration drilling and evaluation of the molybdenum and copper resources. In the 1970s increases in molybdenum prices occurred and Anaconda began detailed evaluation of development alternatives. This work resulted in ACC's decision to initiate detailed engineering and planning for the Nevada Moly Project, an open pit mine and flotation mill plant to produce molybdenum concentrate for shipment by truck to rail transportation centers in Reno. Copper concentrates will also be produced as a by-product of the molybdenum concentration process.

In 1979 Anaconda requested that Sierra Pacific Power Company (SPPCo), a Nevada-based utility, provide electric power to the ACC property. Electric power requirements for the proposed Nevada Moly Project are estimated at 30 megawatts. After initial feasibility studies, SPPCo proposed to supply power by constructing a 230-kilovolt (kv) transmission line from an existing line near Austin, Nevada, south through the Big Smoky Valley to the ACC property.

SPPCo's proposed transmission line corridor would cross public land administered by the Bureau of Land Management (BLM), Battle Mountain District. In July 1979, SPPCo filed a preliminary right-of-way application with the BLM, requesting occupancy and use of public lands for construction and operation of the proposed electric transmission line. The SPPCo application initiated an internal BLM analysis which established jointly with SPPCo and ACC the requirement for preparation of an Environmental Impact Statement (EIS).

The right-of-way application is the only action over which BLM has permitting authority. The BLM has no authority over any aspect of the construction or operation of the molybdenum mine or mill and normally these would not be considered part of the proposed action to be analyzed in the EIS. However, joint discussions between BLM, ACC, and SPPCo resulted in an agreement that the definition of the Proposed Action should also include the mining operation. Reasons for this approach are:

1. The triggering action for the SPPCo right-of-way application is ACC's desire for electrical power for its mine and mill operation. There would be no application without the ACC proposal. Thus, the conclusion was that they are closely related actions which should be discussed in the same EIS.
2. It was anticipated that the cumulative impacts for the right-of-way and mining project could be significant.

The EIS discusses both the ACC mine/mill complex and the SPPCo transmission line. Alternatives to the Proposed Action include:

1. Alternative routing for the transmission line.
2. Construction of the transmission line on either the proposed or alternative right-of-way utilizing alternative construction materials.
3. Development of the mine/mill complex using an alternative milling process.
4. BLM denial of the right-of-way application resulting in ACC's construction of on-site generating facilities.

Several additional alternatives were considered during planning and engineering phases of the mine/mill complex and during the EIS scoping process. These are briefly discussed later in the EIS, but not analyzed in detail because they were not considered reasonable alternatives in the sense that they satisfy the pruposes and objectives of the Proposed Action.

PROPOSED ACTION

Overview

The Proposed Action includes two major components, a molybdenum mine/mill complex and a 230kv electric transmission line. The mine/mill facility would be located approximately 18 miles northwest of the town of Tonopah in Nye County, Nevada. The facilities would be located on a combination of ACC's privately owned land and public land on which the company has located mining claims under the general mining laws. The mining laws permit use of the claims for mining and milling purposes as if they were private land (Map 1-1). The transmission line would be located entirely on public lands and would run from an existing 230kv line (Sierra Pacific Intertie Number One) in Lander County north of Austin, south 86 miles along the east side of the Big Smoky Valley to the Anaconda property. Land requirements for the project are summarized in Table 1-1.

The ore body at the Anaconda property contains approximately 150 million metric tons of mineable reserves, based on 1979 molybdenum prices. The mining plan calls for processing of approximately 150 million tons of ore over a total productive life of 20 years. The schedule for the project shown in Figure 1-1 assumes commencement of full production in October 1981, continuing through the year 2001. Mine

TABLE 1-1

LAND REQUIREMENTS FOR MAJOR COMPONENTS OF THE NEVADA MOLY PROJECT

(ALTERNATIVES AND PROPOSED ACTION)

	Land Requirements for Each Alternative (Acres)				
Components	Proposed Action	1. West Smoky Corridor	2. Tower Designs	3. Crushing Grinding Circuit	4. No Action
Electrical Power Transmission System					
Materials storage yard	3	same[1]	same	same	0
Switching station	4	same	same	same	0
230kv transmission line right-of-way	1,459[2] (86 miles)	1,544[2] (91 miles)	same	same	0
Total	1,466	1,551	same	same	0
Mine/Mill Complex					
Open pit mine	456	same	same	same	same
Waste disposal areas	980	same	same	same	same
Soils stockpile	90	same	same	same	same
Mill and office facilities	173	same	same	same[3]	same
Tailings dam and pond	1,085	same	same	same	same
Road and utility corridor	156	same	same	same	same
Self-generation facilities	0	0	0	same	50[4]
Total	2,940	same	same	same	2,990

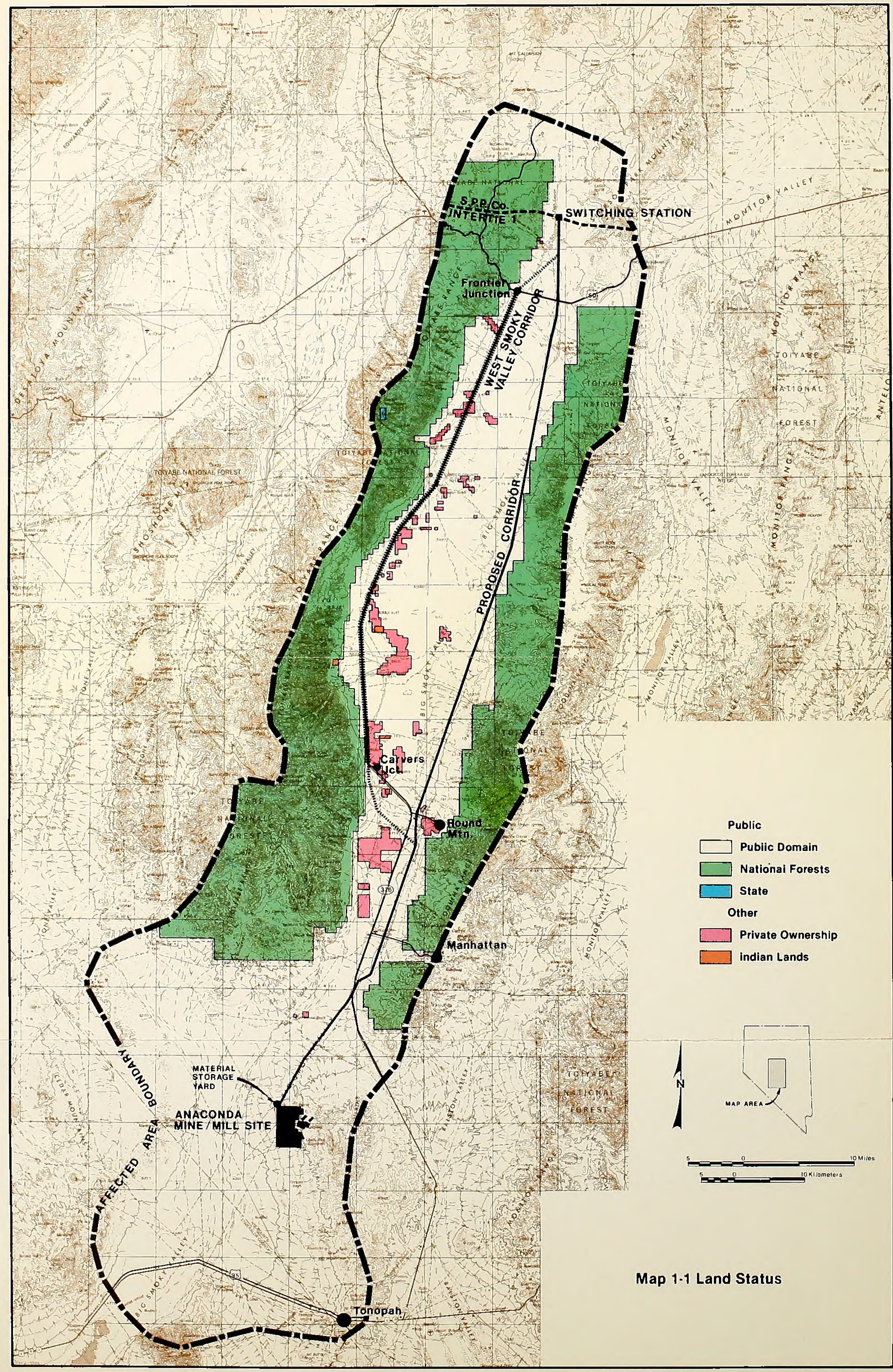
[1]Same indicates equal to land requirements for Proposed Action.

[2]Land requirements for the transmission line include the total 140-foot right-of-way. Actual disturbance would not equal the total land requirement. See Table 1-9.

[3]Additional land requirements for the secoundary crushing plant and fine ore storage pile would be less than one acre.

[4]This value was assumed by the EIS team.

Source: Anaconda Copper Company and Sierra Pacific Power Company.



Map 1-1 Land Status

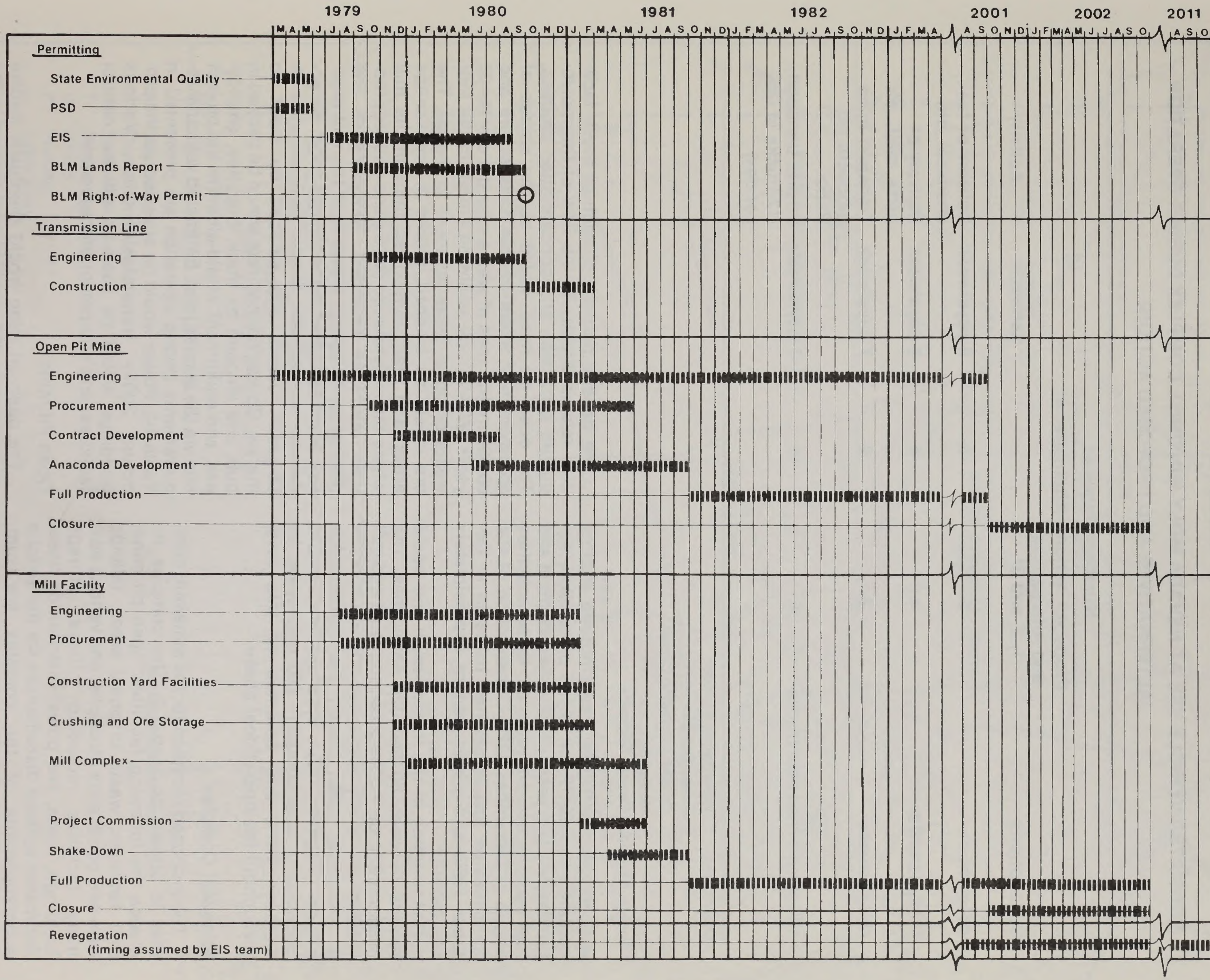


FIGURE 1-1. Development Schedule for the Proposed Anaconda Nevada Moly Project
Source: Anaconda Copper Company

TABLE 1-2

ESTIMATED VEHICLE USE AT NEVADA MOLY MINE/MILL COMPLEX DURING OPERATION
(ALTERNATIVES AND PROPOSED ACTION)

Descriptions	Numbers Required: Proposed Action and Alternatives 1, 2, and 3[1]	Numbers Required: Alternative 4[1]	Schedule	Activity
40-ton truck	2	3	5 days/week	Delivery of fuel, chemical, etc.
Pickup trucks	4	5	5 days/week	Delivery of parts, mail, etc.
40-ton trucks	2	2	7 days/week	Transport mine products to Reno
120-ton off-road haul trucks	16	16	7 days/week	On-site transport (12 trucks in use per day)

[1]Alternatives:
1. West Smoky Corridor
2. Tower Designs
3. Crushing/Grinding Circuit
4. No Action

Source: Anaconda Copper Company

abandonment activities would require approximately one year. Prior to full production, approximately two years of mine development and mill construction are required; these activities began in December 1979. Construction of the transmission line is planned to begin in October 1980, and would require approximately five months.

Construction of the transmission line would require between 80 and 120 employees. The peak work force for the proposed mine and mill is estimated at 936 employees and would occur in December 1980, during the construction phase (Figure 1-2). Employment would decrease to approximately 400 employees by October 1981, and continue at this level throughout the operational phase.

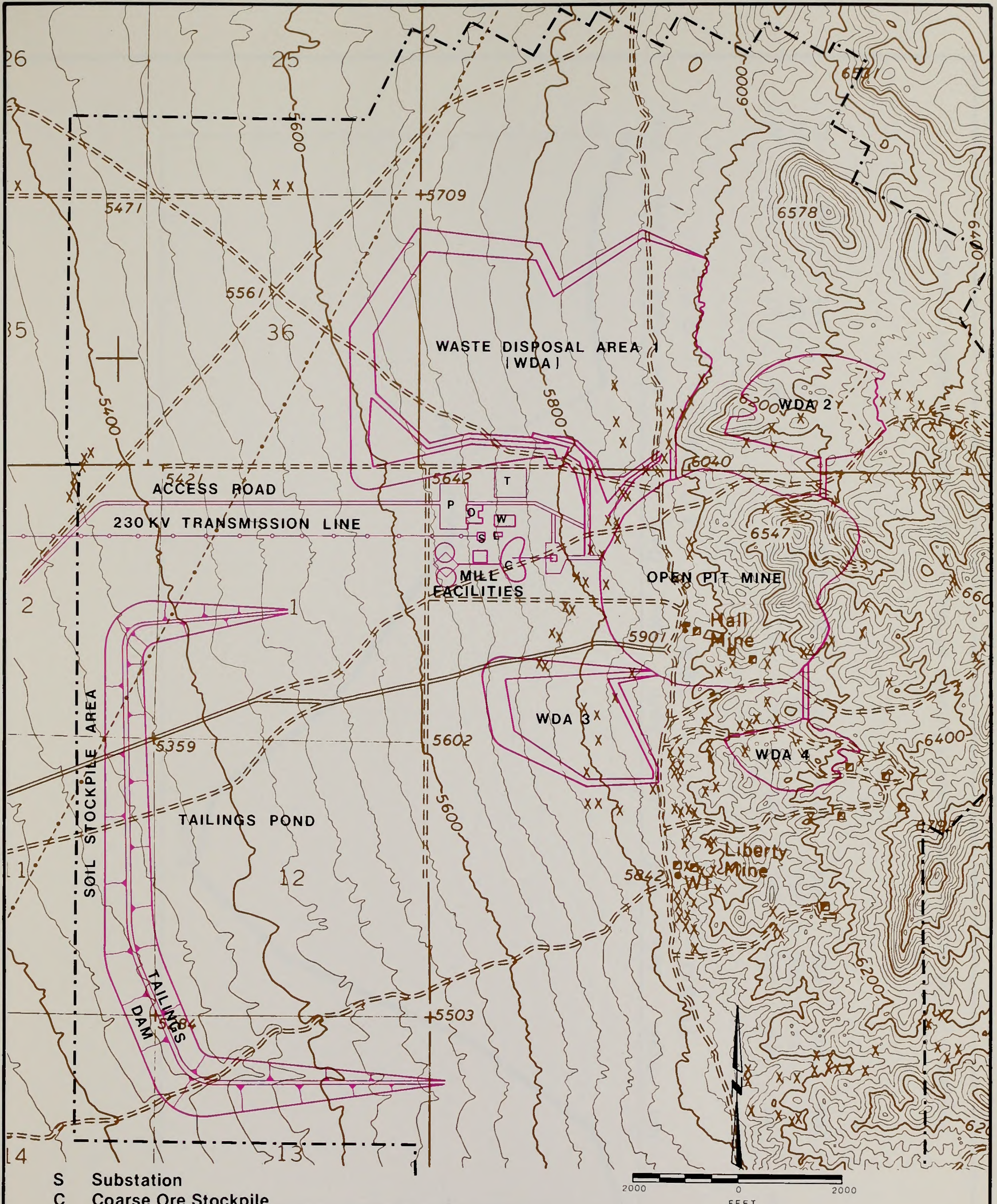
Mine/Mill Complex

The proposed plot plan for the mine/mill complex is shown on Map 1-2. The complex includes the following facilities: open pit mine; mill facilities; waste disposal areas; tailings dam and pond; soils stockpile; and various auxiliary facilities including offices, storage buildings, roads, and power distribution lines. Estimated surface disturbances for the various subcomponents of the complex are summarized in Table 1-1.

The general purpose of each of these facilities relates directly to the flow of the molybdenum extraction and concentration process. The open pit mine would be the source of approximately 20,000 metric tons of ore and 80,000 metric tons of waste rock per day for 20 years. Waste rock would be stored in the four waste disposal areas adjacent to the pit. The ore would be crushed, stored in ore storage areas, and then transported through the mill where the molybdenite (MoS_2) and copper products would be extracted, concentrated, and packed for shipping. Waste from the mill process would be stored in the tailings pond. Molybdenum concentrate would be packaged in 55-gallon drums and shipped by truck to market. Copper concentrate would be packed in bulk and shipped by truck. Supplies, employees, and equipment would all enter the project site via the access road. Estimated vehicular requirements during operation are presented in Table 1-2. Power would be supplied via the proposed 230kv transmission line. Various buildings would be used as offices, control facilities, and equipment storage areas.

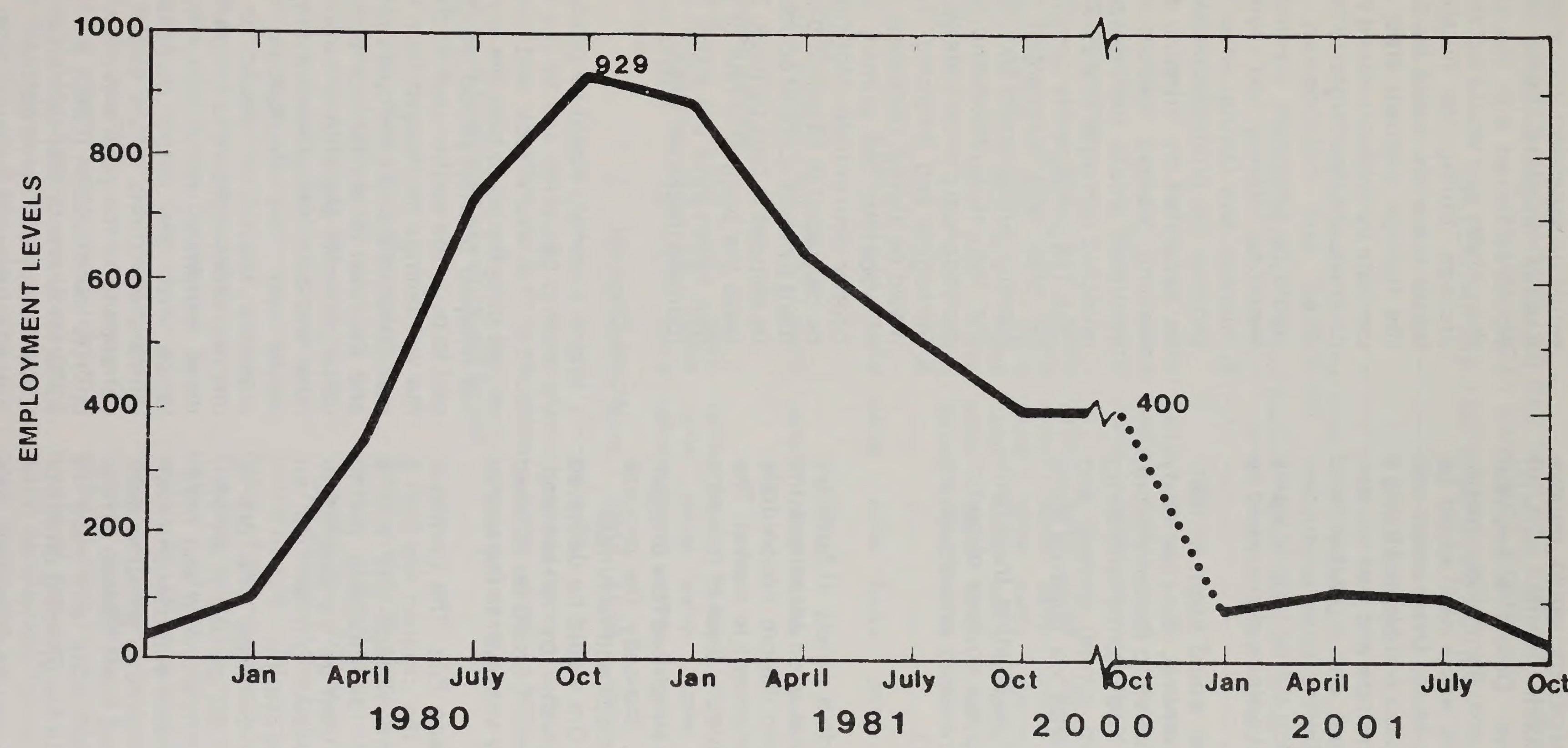
Open Pit Mine

The open pit mine would eventually involve approximately 456 acres of land located in the



S Substation
C Coarse Ore Stockpile
SW Shop Warehouse
T Temporary Yard
O Office
P Parking
L Laboratory

MAP 1-2 Proposed Mine/Mill Complex for the Nevada Moly Project



	Jan 1980	April 1980	July 1980	Oct 1980	Jan 1981	April 1981	July 1981	Oct 1981	Jan 2001	April 2001	July 2001	Oct 2001
Construction	89	269	535	660	600	340	165	0	56	87	94	20
Permanent	14	81	200	269	281	300	350	400	35	24	15	15
Total	103	350	735	929	881	640	515	400	91	111	109	35

Figure 1-2. Estimated Employment Levels at the Nevada Moly Mine/Mill Complex

steep foothills at the base of the San Antonio Mountains. Mining operations would remove approximately 769 million metric tons of material from the area. During a two-year prestrip period, soil and 35 million metric tons of overburden, and waste rock would be removed from the ore body. Overburden and waste rock would be drilled and blasted using a mixture of ammonium nitrate and fuel oil, and removed by truck/shovel and truck/front-end loader combinations. During mine production approximately 584 million metric tons of waste rock and 150 million metric tons of ore would be removed.

Full-scale ore removal would begin in 1981. As with overburden removal, the ore body would be drilled and blasted to loosen the ore. Ore would be loaded into 120-ton end-dump trucks by 17-cubic yard mining shovels and hauled out of the pit area via unpaved mine haulage roads.

Mining activities such as blasting, truck haulage, and truck dumping are sources of particulate air pollutants. Predicted emissions are summarized in Table 1-3.

Mill

The mill would include a variety of facilities and processes which are used to extract the molybdenite product from the ore, concentrate it, and package it for shipment to market. The mill would be located directly west of the mine pit (Map 1-2).

Figure 1-3 presents a simplified flow diagram of the milling process. Basically, the process involves the following steps and facilities:

1. Primary Crusher. Ore would be delivered to the primary crusher by 120-ton end-dump trucks. There it would be crushed and discharged by conveyor to the coarse ore storage pile.
2. Coarse Ore Storage Pile. The conveyor would discharge the crushed ore into a conical coarse ore storage pile with a total capacity of 134 thousand metric tons. Ore would then be transported to the semi-autogenous grinder via an enclosed conveyor system.
3. Semi-autogenous Grinders. The ore is mixed with water and ground to an even smaller size to form a slurry, and transported to the flotation and concentration system. Semi-autogenous grinding uses the ore to help grind itself, instead of relying only on steel balls and rods to pulverize the ore in the grinding drums or mills.
4. Flotation and Concentration System. This system includes several progressive steps through which the molybdenite would be separated from waste materials. Various reagents, listed in Table 1-4, would be mixed with the slurry leaving the grinder and would aid the separation process. During the flotation process, waste materials would be discharged to the tailings disposal area; copper concentrate by-products would be separated, cleaned, and discharged to be filtered and dried; and molybdenum concentrate would be separated, cleaned, and transferred to filtering and drying facilities.
5. Filtering and Drying. After the flotation process, the product concentrates would be separated by filtration from the remaining process medium. Copper concentrates would be transported by an enclosed conveyor to a 2,000-ton storage pile. The molybdenite concentrate would be dried and discharged to a bucket elevator which would take the product to the top of a 200-metric ton capacity molybdenum concentrate storage bin.
6. Packaging and Shipping. Two products would be stored, packaged, and shipped: molybdenite, the primary product, and copper concentrate. Molybdenum would be packaged in 55-gallon drums for shipment by truck. Copper concentrate would be shipped in bulk by truck. Trucks would leave the plant at a rate of two trucks a day, seven days per week, for a total of fourteen trucks per week.

Waste Disposal

Waste materials would be produced by both the mining operation and by the concentrator facility. The waste rock and overburden removed from the pit to bare the ore body during the two-year prestrip period would be used in part to build the earthen dam or dike to contain the wet tailings discharged from the molybdenum concentrator. As the operation progressed and the level in the tailings pond rose, additional pit waste and alluvium would be used to raise the dike in successive stages. Surplus waste rock and overburden, or unstable materials would be placed in the waste disposal areas adjacent to the pit. Placement of these materials would occur in successive layers over the entire disposal area. The ultimate elevations in the waste areas would correspond to the peak elevation of each area prior to construction (6,060, 6,094, 6,327, and 6,393 feet). Waste disposal areas would eventually occupy 980 acres adjacent to the pit.

Waste materials (tailings) from the concentration facilities would be discharged to the

TABLE 1-3

ESTIMATES OF CONTROLLED PARTICULATE EMMISSIONS FROM THE NEVADA MOLY MINE/MILL COMPLEX

(ALTERNATIVES AND PROPOSED ACTION)

			Alternatives							
	Proposed Action		1. West Smoky Corridor		2. Tower Designs		3. Crushing/ Grinding Circuit		4. No Action	
Sources	Annual (ton/yr)	Max 24-hr (lb/hr)	Annual (ton/yr)	Max 24-hr (lb/hr)	Annual (ton/yr)	Max 24-hr (lb/hr)	Annual (ton/yr)	Max 24-hr (lb/hr)	Annual (ton/yr)	Max 24-hr (lb/hr)
Fugitive Dust Sources										
Overburden drilling	7.8		same[1]	same	same	same	same	same	same	same
Overburden blasting	4.4		same	same	same	same	same	same	same	same
Overburden removal	317.0	83.8	same	same	same	same	same	same	same	same
Haul road construction and repair	34.5	9.1	same	same	same	same	same	same	same	same
Haul road traffic	970.0	257.0	same	same	same	same	same	same	same	same
Overburden dumping	19.8	5.3	same	same	same	same	same	same	same	same
Wind erosion	96.2	22.0	same	same	same	same	same	same	same	same
Ore removial	127.0	33.5	same	same	same	same	same	same	same	same
Ore dumping	2.4	0.7	same	same	same	same	same	same	same	same
Subtotal	1,579.1	411.4	same	same	same	same	same	same	same	same
Vehicular Exhaust										
Diesel/gasoline exhaust	6.3	1.5	same	same	same	same	same	same	same	same
Industrial Process Sources										
Concentrator	11.2	3.2	same	same	same	same	66.1	18.9	same	same
Coarse ore stockpiles	2.4	0.6	same	same	same	same	same	same	same	same
Molybdenum dryer	1.5	0.3	same	same	same	same	same	same	same	same
Self-generation facilities	0	0	same	same	same	same	same	same	55.6	16.0
Subtotal	15.1	4.1	same	same	same	same	70.0	19.8	70.7	20.1
Total	1,600.5	417.0	same	same	same	same	1,655.4	432.7	1,656.1	433.0

[1]Same indicates equal to estimates for Proposed Action.
Source: ERT EIS Team

tailings containment area. This area would occupy approximately 1,085 acres of land (includes both dike and pond) at the end of the 20-year production period. Tailings containing fine rock particles separated from the product materials in the flotation process, process water, and reagents to aid the molybdenum extraction process would be distributed from spigots along the downside dike of the pond when the concentrator is in continuous operation. The tailings would be approximately 50 percent solids by weight when piped into the pond; subsequent densification would result in approximately 70 percent solids by weight. Initial tailings storage of 8,435 acre-feet (or two years' operation), plus 2,595 acre-feet for flood and water storage would be provided. The tailings storage area would have an ultimate capacity of 91,500 acre-feet of tailings.

The design of the tailings dam (Bechtel 1980) would be approved, prior to construction, by the State of Nevada Division of Water Resources. The dam would be constructed using local competent material obtained from borrow areas within the tailings disposal area and from the mine pit. Materials used in constructing the tailings embankment would be processed and sized to meet the structural and safety requirements of the dam. The dam was designed to resist earthquake forces (which have a 90 percent likelihood of *not* being exceeded in a 50-year period) that might be generated by

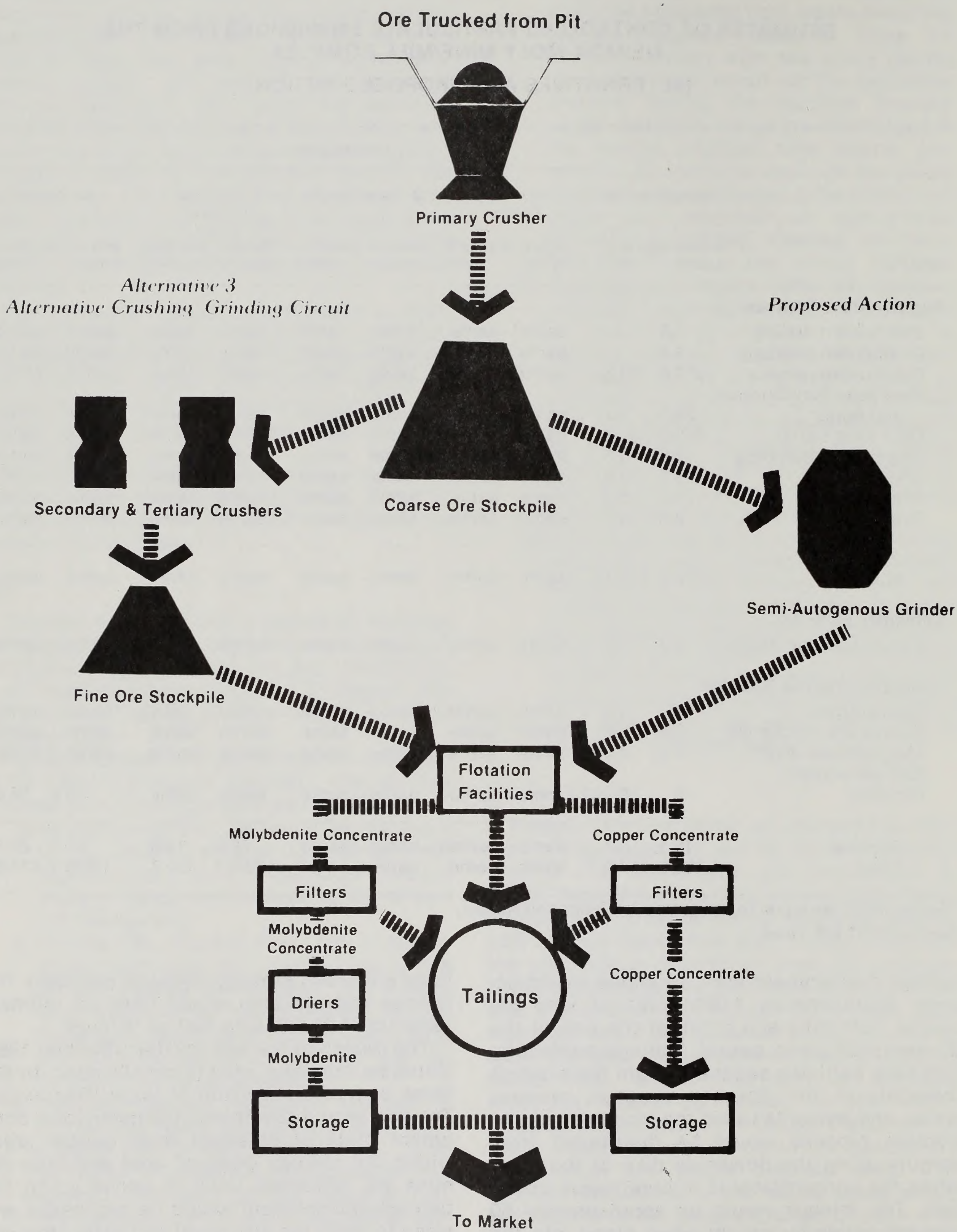


Figure 1-3. Simplified Diagram of the Nevada Moly Milling Process (Proposed and Alternative 3)
Source: Anaconda Copper Company

TABLE 1-4

REAGENTS USED IN CONCENTRATION PROCESS

Name	Purpose
Pebble lime	Preparation of milk of lime for use as a pH regulator and depressant for iron sulfides and SO_2 scrubbing
Diesel oil	Flotation - Promoter
Sodium silicate	Flotation - Dispersant
Xanthate	Flotation - Collector
Methylisobutyl carbinol	Flotation - Frother
Pine oil	Flotation - Frother
Ammonium sulphide	Flotation - Depressant
Sodium hydrosulphide	Flotation - Depressant
Flocculant	Thickeners

Source: Anaconda Copper Company

seismic activity at the site. The design of the dam included an internal filter which prevents the hydraulic movement of dam construction materials and an internal drain which prevents the seepage of tailings or other liquid through the dam.

The ultimate embankment would be approximately 6,100 yards long and at its highest point would be approximately 200 feet high above the ground surface. The ultimate crest elevation for the embankment would be approximately 5,500 feet above sea level. The finished embankment would have a 2.5 horizontal to 1 vertical slope on the downstream face.

Auxiliary Facilities

A variety of auxiliary facilities would also be needed at the mine/mill complex.

Electric Power. The estimated average operating load of the plant would be 30 megawatts. Electric power would be delivered to the main plant substation at 230kv by SPPCo. The substation would be located adjacent to and on the south side of the concentrator (Map 1-2). Power would be distributed to the local electrical rooms in the plant area utilizing underground ducts. Power would be distributed to the mine and to the well pump and barge reclaim pump areas utilizing overhead lines.

Water Supply. Water supply would come from wells located on the property. One 2,000-gallon per minute (gpm), 1,200-foot deep service water well would be provided initially with four similar wells planned for future construction. The service water wells would be spaced approximately 4,000 feet apart. Each well would penetrate the full thickness of the aquifer and would be assumed to operate at an efficiency of 70 percent. The supply would be sized for initial plant start-up requirements of approximately 6,200 gpm which assumes there would be no reclaim water available from the tailings pond. Water would be reclaimed from the tailings pond and recycled in the mill process as soon as feasible, reducing the total water requirement to approximately 3,000 gpm.

Roads. U.S. 95, Nevada Route 89, and a county-maintained road (presently gravel, but it is understood that the county is considering paving the road) serve the site from Tonopah

Roads within the plant site would consist of main plant roads and maintenance roadways. Main plant roads would consist of 24 feet of pavement with 6-foot shoulders. Roads within the mine pit would be unpaved and 100 feet wide.

Sanitary Waste Facilities. During the construction period, sanitary wastes would be collected from discharge points within the plant area and piped to septic tanks for treatment and disposal. The design of the septic system would include a seepage control system approved by the State of Nevada. During the operation of the plant, sanitary wastes would be collected and treated in a self-contained, tertiary treatment system.

Service Buildings. Service buildings would consist of a 39,200-square foot office building, a 22,000-square foot truck garage, a 15,000-square foot warehouse, a 15,000-square foot maintenance shop, and a 4,800-square foot laboratory. Service buildings would be of light steel frame modular construction with a minimum roof slope of 3 inches per foot. Roofing and siding for all buildings would be metal.

Fuel Systems. One 5,000-gallon gasoline and one 400,000-gallon fuel oil tank would be provided to service the mine trucks and service vehicles. Fuel oil for use as a flotation reagent would be stored in a 20,000-gallon storage tank. As a spill control measure, berms would be constructed around fuel oil storage tanks. Fuel oil and gasoline would be delivered by truck and complete pumping systems would be provided for transferring fuel from storage to use areas.

Total fuel requirements for the proposed mine/mill complex would be 2,557,500 gallons per year as shown in Table 1-5.

Revegetation Guidelines

Because the mine/mill complex would be in operation until the year 2001 and revegetation would not be possible until after mine/mill closure, ACC has not developed a detailed revegetation plan at this time. However, ACC would develop a detailed plan during the course of the project. ACC has stated that the mine pit area would not be revegetated, but that revegetation would be attempted on all other disturbed areas. General guidelines for the revegetation effort have been developed and are presented in Appendix A. ACC plans to complete on-site experimental tests throughout the project to determine the techniques to be employed during specific revegetation. Results of these tests would be used to modify the general guidelines of Appendix A.

To aid future revegetation efforts, ACC would strip soil materials and store these materials in the soils stockpile. The top 6 to 12 inches of soil would be salvaged, during project operation, from the areas to be occupied by the tailings embankment and tailings pond. This area would eventually include 1,085 acres.

Standard Operating Procedures at the Mine/Mill Complex

The following procedures are real and committed by ACC and would be utilized in implementing the mine/mill complex:

1. Buildings included in the mine/mill complex would be painted in neutral colors that would blend with the natural landscape.
2. All electrical equipment and construction would be in accordance with the National Electric Safety Code, Nevada local codes, and Federal Office of Safety and Health Administration (OSHA) standards.
3. Septic tanks would be designed in accordance with the Uniform Plumbing Code and United States Public Health Service-526. The septic system would be approved by the State of Nevada prior to construction.
4. Revegetation procedures would be developed expanding on guidelines given in Appendix A. Anaconda would implement the following procedures during reclamation for the project.
    - Disturbed areas outside the pit perimeter would be recontoured to blend with the existing topography to the extent possible. Coarse cover material would be used to control fugitive dust. Following mine closure, ACC would attempt to revegetate the areas involved, utilizing the results of experimental determinations that would be carried out over the course of the mine life.
    - Materials used for outer layers in constructing the tailings embankment would be used in experimental plots to evaluate revegetation procedures.
    - Inactive areas of the tailings pond surface would be used for test plots to evaluate revegetation procedures for the tailings material.
5. Air pollution control techniques which would be utilized during mining activities are as follows:
    - Drilling and Blasting. Drilling emissions would be controlled by the standard procedure of maximizing hole spacing. Blasting emissions would be controlled by stemming charged holes, backfilling with drill cuttings, regulating explosive charges, and controlling hole spacing to maximize the amount of fractured material while limiting the dust produced during each blast.
    - Haul Roads. Vehicle speed would be low. Within the pit, speeds would average approximately 15 miles per hour (mph). The average speed outside the pit would be 20 mph. The mining plan has been designed to minimize the haul distance between pit and ore or waste dumps. Vehicles would be restricted to designated roadways.
    - Truck watering would be used on the haul road system at the mine/mill site

TABLE 1-5

FUEL AND ELECTRICAL ENERGY REQUIREMENTS FOR THE NEVADA MOLY PROJECT (ALTERNATIVES AND PROPOSED ACTION)

		Alternatives			
	Proposed Action	1. West Smoky Corridor	2. Tower Designs	3. Crushing/ Grinding Circuit	4. No Action
Energy Requirement					
Electrical power for operation of mine/mill complex	30 megawatts	same[1]	same	28 megawatts	none
Construction Fuel Requirement					
Construction of transmission line	39,483 gallons	same	same	same	none
Transportation of Construction workers to site[2]	693,300 gallons	same	same	same	same
TOTAL	732,783 gallons	same	same	same	693,300 gallons
Project Operation Requirements					
On-site fuel requirements[2]	2,557,500 gallons	same	same	same	same
Transportation of workers to site[2]	256,000 gallons	same	same	same	same
Self generation[2]	none	same	same	same	6,570,000 gallons
TOTAL ANNUAL	2,813,500 gallons	same	same	same	9,383,500 gallons

[1]Same indicates equal to estimates for Proposed Action.
[2]Annual fuel requirements.
Source: Compiled by ERT EIS Team

to suppress fine particles and prevent them from becoming airborne.

- Truck Dumping. Molybdenum-bearing ore taken from the pit would be transported to a hopper feeding the crusher unit of the concentrator facility. The dumping point would be controlled by a water spray system.

6. The primary crusher would be equipped with a dust control system consisting of ducts leading from points of dust production (i.e., conveyor loading) to an 11,000-actual cubic feet per minute (acfm) wet dust collector. Additionally, dust suppression spray located at the truck dump pocket of the crusher would be activated during truck dumping. The conveyor would be covered.
7. In the enclosed conveyor transporting ore to the semi-autogenous grinder, dust control would be effected by two 13,200-acfm wet dust collectors.
8. Placement of materials in the waste dump areas would be from areas of higher elevation to lower. This would alleviate the formation of isolated mounds of waste rock by developing a continuance with existing topography.
9. The downstream surface of the tailings embankment would be planted at the termination of the enlargement process to prevent wind erosion and the generation of dust. During embankment construction, the temporary downstream surface would be surfaced with mine waste, as necessary, to reduce dust generation.

10. Monitoring instruments would be utilized at the tailings dam and readings of static water levels would be evaluated regularly as a safety measure.
11. A monitoring well would be installed at a strategic location near the tailings dam to assess the potential movement of water which might contain dissolved solids. Samples would be taken and analyzed on a monthly basis.
12. ACC would comply with the requirements of state and Federal threatened and endangered species legislation.
13. As noted in Chapter 2, eleven plant species which are candidates for the Federal threatened and endangered species list potentially occur in the Big Smoky Valley. These species are not currently protected by state or Federal law. One such species, the fishhook cactus (*Sclerocactus polyancistrus*), was found near the mine/mill site during field investigations. Prior to disturbance, ACC will complete a survey of the mine/mill site to determine actual occurrence of this or other candidate species on site. If any plants are found in areas to be disturbed, they will be transplanted to adjacent areas of suitable habitat, if feasible, or donated to one of several regional botanical gardens. Such action would be in compliance with state and Federal law.
14. Anaconda has acquired approximately 600 acres of land directly northwest of the existing community of Tonopah. This land is suitable for residential development and would be made available for purchase by qualified contractors to encourage such development. Development would proceed in accordance with ACC's conceptual master plan which provides for residential, commercial, transportation, public, and recreation land uses.

230kv Electric Transmission Line

Design Specifications

The proposed electric transmission system would consist of a switching station located on public land, a 230kv transmission line crossing 86 miles of public land connecting to a substation on ACC property. The facilities would be located as shown on Map 1-1. The switching station would require approximately 4 acres of land, and the transmission line right-of-way would be 140 feet wide for a total area of 1,459 acres. The terrain on which the facilities would be constructed is relatively flat and there would be no areas in which construction would be difficult.

The switching station at the tap location on the existing SPPCo Intertie No. 1 would be designed similarly to the station shown in Figure 1-4. The color of materials used in the construction of the station would be in the light gray to tan color range, subject to final approval by the BLM. Transmission line structures would be H-frames constructed of wood poles treated with pentachlorophenol in heavy petroleum oil. The support structure would consist of two upright poles approximately 20 feet apart with steel cross arms forming the "H" and X-bracing for additional strength where required. Poles would average 80 feet in length and be set approximately 10 feet in the ground. The poles would be situated on the terrain to maintain a minimum design clearance of 36 feet between the conductors and the ground surface. Towers would be situated approximately 850 feet apart or approximately 6 per mile for a total of 534.

Conductors would be 795 Mcm nonspecular aluminum conductor-steel reinforced cable. Insulators would be suspension type consisting of 10-inch diameter porcelain dishes painted sky gray. The dishes would be arranged vertically with 15 dishes per line. Static lines would be 3/8-inch nonspecular galvanized steel.

Construction Sequence and Procedures

Eight crews totaling 80 to 120 workers would be involved in constructing the proposed transmission line. Construction access would be by means of existing roads where possible. Overland travel would be employed where no such roads exist. No permanent access roads would be constructed and access routes would be determined according to a plan approved by BLM.

A summary of equipment and vehicles required for assembly and construction is presented in Table 1-6. During the tower site preparation and installation phase, a small pickup, an air compressor, and a backhoe machine or auger truck would be driven to each tower. Tower components would be delivered to the tower site for construction. This would involve pickup trucks and a medium-sized boom-equipped truck, or tracked-type vehicle and large 44,000-pound gross weight transport trucks and trailers. This crew would set the tower in its permanent location.

In the final construction stages, the conductors would be installed with a tensioner and a puller. The tensioner is a large trailer loaded with two to six reels of conductor and a braking device. The puller is equipped with three permanent reels each containing 2 to 3 miles of steel

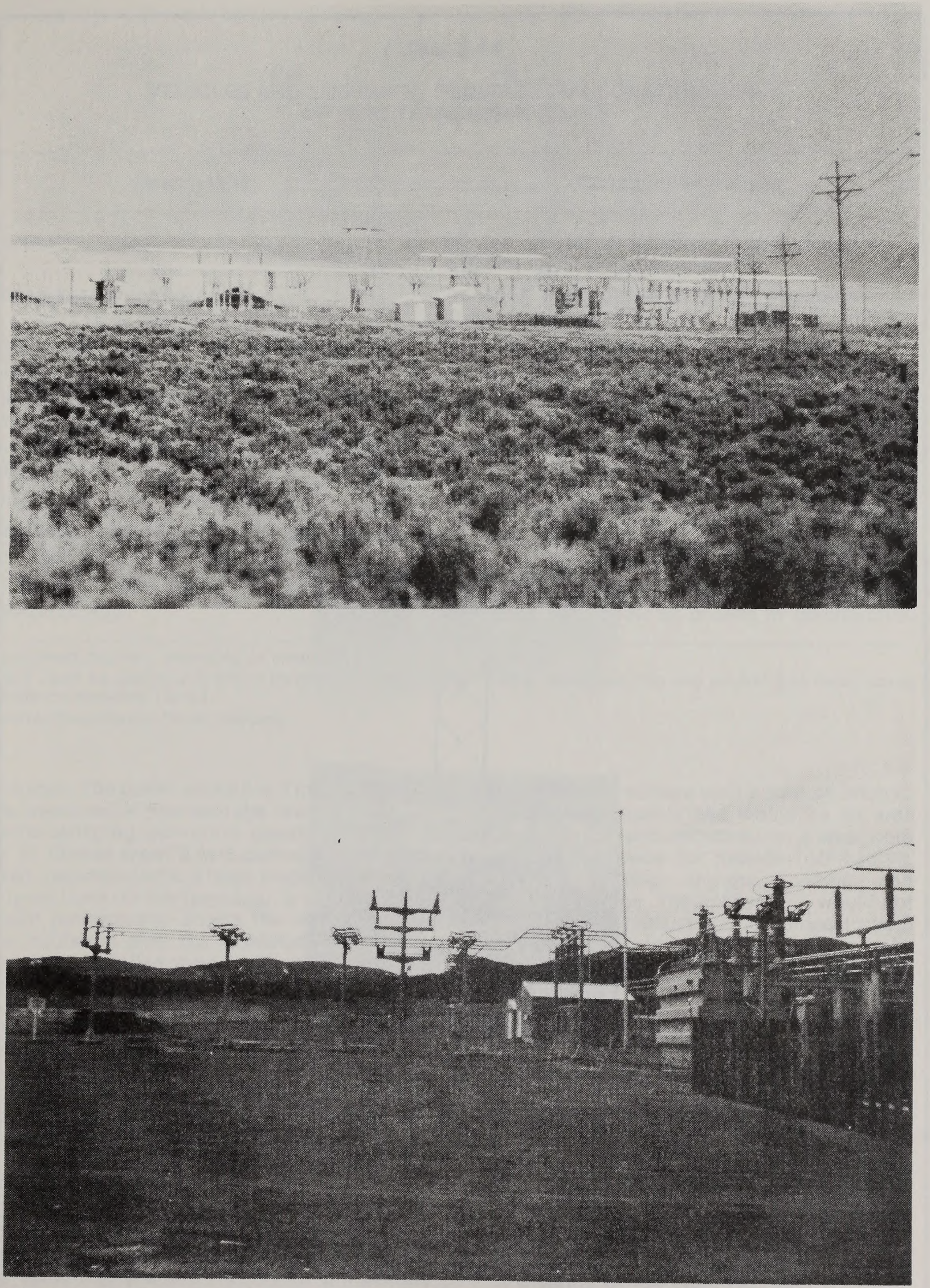
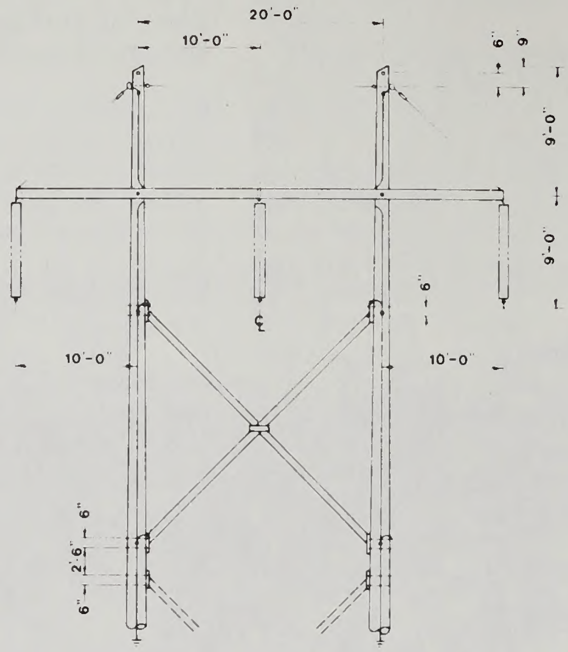
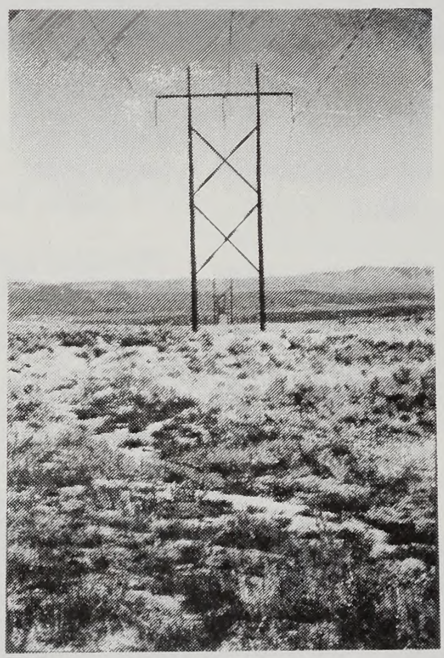


Figure 1-4. Photographs of a Typical Switching Station





Schematic
Photograph (optional double cross bracing shown in foreground)

Figure 1-5. Proposed Transmission Line Support Structure
Source: Sierra Pacific Power Company

TABLE 1-6

VEHICLES AND EQUIPMENT REQUIRED FOR CONSTRUCTION OF 230kv TRANSMISSION LINE

Description[1]	Construction Activity
D8 Cat[2]	Provide access to structure locations where existing roads are not available
Diesel transport trucks	Transport materials for structure assembly (3 deposits/structure)
Truck-mounted auger and 3/4-ton crew cab pickup	Excavation of pole holes
Backhoe and truck transport and 3/4-ton crew cab pickup	Excavate and backfill anchor locations
Truck-mounted crane and 3/4-ton crew cab pickup	Assembly and erection of structures
D4 Cat and 3/4-ton crew cab pickup[2]	Preliminary stringing
Truck-mounted tensioner, truck-mounted puller, and 3/4-ton crew cab pickup	Stringing and tensioning
Bucket truck and 3/4-ton crew cab pickup	Clipping
3/4-ton pickup	Inspection will follow all phases of construction

[1]Equipment may vary, depending on contractor.

[2]Cats would be used only in limited instances to remove large rocks or debris and then only according to limitations of Mitigation Measures 1 and 3.

Source: Sierra Pacific Power Company.

wire rope. The puller works 2 to 3 miles ahead of the tensioner, in line with the towers. The conductor-stringing operation usually requires a 10- to 15-man crew, 3 to 5 pickups, a medium-sized materials truck, a large truck, and a trailer or large truck for the tensioner. A clipping crew would permanently attach the conductors to the insulators after the aluminum conductors have been installed and pulled to the proper sag and tension.

The transmission line would be inspected after all phases of construction. Following construction, the transmission line would be inspected routinely by aerial surveillance. Routine maintenance of the line facilities would include replacement of broken insulators and inspection of all hardware.

Area of Disturbance

Of the total land requirement for the transmission line, only 98 acres would actually be disturbed. This is broken down as 4 acres for the switching station, 3 acres for a materials storage yard, 83 acres for an access trail, and 8 acres total for the 534 tower sites.

The materials storage yard would be located on Anaconda property and would be an area cleared of brush and smoothed for a level work area to allow space for material off-loading, classifying, sorting, storage, loading, and equipment storage. The access trail would not be a permanent road. It was assumed to be 8 feet wide running the length of the transmission line, although final alignment would be subject to field review and approval by BLM prior to the start of construction. Disturbance at each tower site is expected to be confined to a maximum 20-foot by 40-foot area. Vegetative cover would not be routinely removed.

Mitigation Measures for the 230kv Transmission Line

The following measures are real, committed, enforceable, and would be utilized in constructing the proposed transmission line. Final stipulations would be approved by BLM and would form part of the right-of-way permit.

1. Clearing of the disturbed area would be kept to the least amount possible. Vegetation cover would not be removed from

any area unless necessary for construction and approved by BLM. Hand clearing would be used in areas where the use of heavy equipment would be detrimental to existing conditions.

2. Existing telephone, telegraph, and transmission lines; roads; trails; fences; ditches; and like improvements would be protected during construction, operation, maintenance, and termination of the project system. Self-closing gates would be installed, as necessary, where existing fences must be penetrated.
3. All construction access would be reviewed and approved prior to construction with existing roads and trails used wherever possible. All travel would be limited to specified overland routes unless existing roads and trails are available for use. Natural grass and low brush would not be routinely removed. Only brush blade or back-blade techniques would be used in such areas to remove surface rock.
4. Where access trails cross live streams or dry stream beds, culverts or other structures, as determined by BLM, would be installed. Upon termination of use, these items may be required to be removed by BLM. Additionally, no dry or intermittent drainage channels would be blocked with debris, and no soil along roads and trails would be pushed into stream beds.
5. Public land areas used for temporary access roads, equipment storage, and other construction activities would be restored to their natural state insofar as practicable and in accordance with a restoration plan approved by BLM.
6. The material storage yard and all other construction sites would be maintained in a sanitary condition at all times. Areas for storage of flammable liquids would be properly designed to retain liquids if accidental spills should occur.
7. All waste would be removed and disposed in accordance with a plan approved by BLM and in a manner consistent with Federal, state, and local laws and regulations. All paper litter would be removed daily. The term "waste" as used herein means all discarded matter, including, but not limited to, human waste, trash, garbage, refuse, oil drums, petroleum products, ashes, equipment, and temporary buildings. All used chemicals, waste oil, grease, and other petroleum products would be removed to an approved sanitary landfill.
8. Revegetation would be required in areas identified by BLM on the date specified. Practice has shown that late fall is most successful, so in many instances fall seeding would be required. This will usually be accomplished during September, October, and November. Scarification of compacted areas and seeding of disturbed areas would occur after notification by BLM.
9. The seed mix used in revegetation would be determined by BLM and would be provided and applied in accordance with specific instructions and techniques as prescribed by BLM. All seed used would meet all requirements of the Federal Seed Act (7 USC 1551-1610, inclusive) and the seed laws and noxious weed laws of Nevada. Evidence of seed certification would be furnished by the applicant at the request of BLM. All leguminous seed would be inoculated with approved cultures in accordance with manufacturer's instructions.
10. During revegetation, seed, fertilizer, and mulch would be applied uniformly on the designated areas as specified by BLM. No seed, fertilizer, or mulch would be applied when wind velocities would prevent uniform application of the material on the designated areas.
11. Mulch would be utilized where necessary to achieve revegetation, as specified by BLM, and would consist of straw, hay, or specially prepared wood cellulose fiber processed in such a manner that it contains no growth or germination inhibiting factors and would be free of noxious weed seed.
12. Whenever revegetation is required, a notice would be filed with BLM when such planting is complete. The notice would contain information regarding location of the area, type of planting or seeding (including mixtures and amounts), date of planting, and other relevant information as may be required by BLM.
13. Inspection and evaluation of revegetation measures taken would be made by BLM after completion of the first growing season with further evaluation during the following growing season. If rehabilitation measures as listed above fail to become established in two growing seasons due to inadequate reseeding techniques or drought conditions, the applicant would be required to reseed the previously treated area. At the end of the

two-year period following the second seeding, the applicant would be relieved of further responsibility.

14. Reasonable means would be used to minimize erosion and soil damage in connection with any construction, rehabilitation, or maintenance operations, including (but not limited to) construction of water bars, cross ditches, or other structures, if necessary.
15. Any ruts, depressions, or other such disturbance caused by construction would be restored.
16. Transmission line structures to be utilized are designed to eliminate the possibility of the electrocution of large birds.
17. Measures necessary to assure unrestricted passage and movement of fish and wildlife would be taken. No artificial structure or stream channel alteration that would cause a blockage to the movement of fish would be allowed.
18. The applicant would comply with any special requirements made by BLM for a stream system. All operations would be conducted in such a manner as would avoid permanent blockage of any drainage system; changing the character or causing the pollution or siltation of rivers, streams, reservoirs, ponds, water holes or springs; and damaging fish and wildlife resources and habitat.
19. Mobile ground equipment would not be operated in streams, ponds, springs, water holes, or reservoirs unless such operation is approved in writing by BLM.
20. Facilities would be located so as to provide a 300-foot minimum buffer strip of undisturbed land on each side of a stream or river, unless otherwise approved by BLM.
21. The services of qualified archeologists and/or historians would be engaged to complete intensive cultural resource field surveys (BLM Class III) for any unsurveyed portions of the right-of-way or temporary use permit areas. Such surveys must be completed, documented, and a report submitted to BLM. Protective measures shall be approved by BLM and implemented prior to any construction activities.
22. Prior to commencing operations, a report would be furnished to BLM stating that either no archeological values exist or that archeological values exist on the affected area. If the report states that archeological values exist, qualified cultural resource professionals will be required to undertake salvage of cultural properties subject to loss or substantial alteration, prior to commencing operations. When such salvage is indicated, it would only be completed under a scientifically sound research design agreed to by BLM. The Nevada State Historic Preservation Officer and/or the Advisory Council on Historic Preservation would also be consulted as necessary.

    Salvage would be required when BLM has determined that it is the most reasonable and prudent course of action. The salvage work would be documented by an analytical report, submitted to BLM for review and acceptance. Actual construction may proceed before receipt of the final report, but not before BLM has determined that required cultural resources recovery (salvage) work has been completed in the field, and additionally, determined that there is reason to believe that a final report would be submitted within a reasonable amount of time.
23. BLM would be immediately notified of all antiquities or other objects of historic or scientific interest, including (but not limited to) historic or prehistoric ruins, fossils, or artifacts discovered as a result of operations and such discoveries would be left intact. Failure to comply with any of the terms and conditions imposed by BLM with regard to the preservation of antiquities may constitute a violation of the Antiquities Act (16 USC 431-433).

    If previously undiscovered cultural resources should be found during actual construction activities of the transmission line, BLM would require construction activities for that area to be temporarily halted until the resource(s) can be inspected and appropriate surveys completed by a qualified cultural resources professional.

    The responsibility for the cost of the required report, survey, and any necessary salvage will be borne by the applicant and such salvaged material will remain the property of the United States.
24. It is BLM policy to protect and conserve species which are candidates for the list of threatened and endangered species as if they were on the list. Accordingly, a survey of the selected transmission line route would be conducted, prior to construction, to determine the actual occurrence of eleven candidate plant species which potentially occur in the Big Smoky Valley. If any of these plants are found,

appropriate measures would be implemented to prevent their disturbance.

ALTERNATIVES

Potential alternatives to the Proposed Action include alternate sources of energy; alternate locations for the transmission line; alternate facilities' design and location at the mine/mill complex; and alternate designs and materials for the transmission line. During the scoping process and early EIS preparation process, various alternatives under each of these categories were reviewed and four alternatives selected for detailed analysis in the EIS. The following sections describe those alternatives analyzed in detail and describe the reasons for eliminating other possible alternatives.

Alternatives Receiving Detailed Study

The four alternatives to the Proposed Action which are considered in detail are:

1. Alternative Corridor Route
2. Alternative Structures and Materials for the Transmission Line
3. Alternative Crushing/Grinding Circuit for the Mine/Mill Complex
4. No Action

Alternative 1, West Smoky Valley Corridor

This alternative is similar to the Proposed Action except that the 230kv transmission line would be located on the west side of the Big Smoky Valley, rather than the east. The location is shown on Map 1-1. Two options for placing the line are considered in the EIS, construction on either the east side or west side of Highway 376 between Frontier and Carver's Junction. The West Smoky Valley Corridor Alternative would be 91 miles long and would involve identical design procedures as the Proposed Action. Of the total land requirements for this alternative, 103 acres would actually be disturbed.

Alternative 2, Alternative Structures and Materials for the Transmission Line

This alternative considers four tower designs which could be utilized in constructing the 230kv transmission line. These are illustrated in Figures 1-6 and 1-7. Design specification and construction procedures are otherwise identical to those described for the Proposed Action. Land requirements for each alternative design are summarized in Table 1-7.

Alternative 3, Alternative Crushing/Grinding Circuit for the Mine/Mill Complex

This alternative crushing/grinding circuit differs from the grinding circuit associated with the Proposed Action in that additional crushers, fine ore stockpiles, and a different type of mill would be utilized. The differences between the two grinding circuits are shown in Figure 1-3.

TABLE 1-7

COMPARISON OF AREAS DISTURBED BY PROPOSED AND ALTERNATIVE TRANSMISSION LINE STRUCTURES FOR THE NEVADA MOLY PROJECT

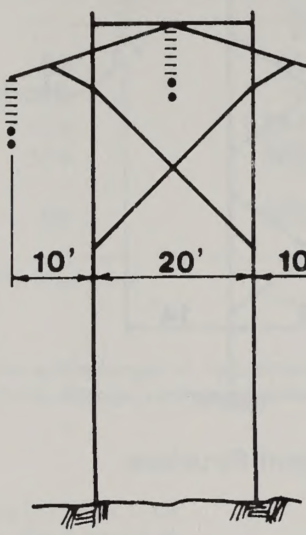
Structure Design[1]	Acres Disturbed[2]
Proposed	
Wood H-frame	98
Alternatives	
Wood K-frame	98
Aluminum[3]	98
Concrete	100
Steel	104

[1]Calculations were based on tangent structure designs.

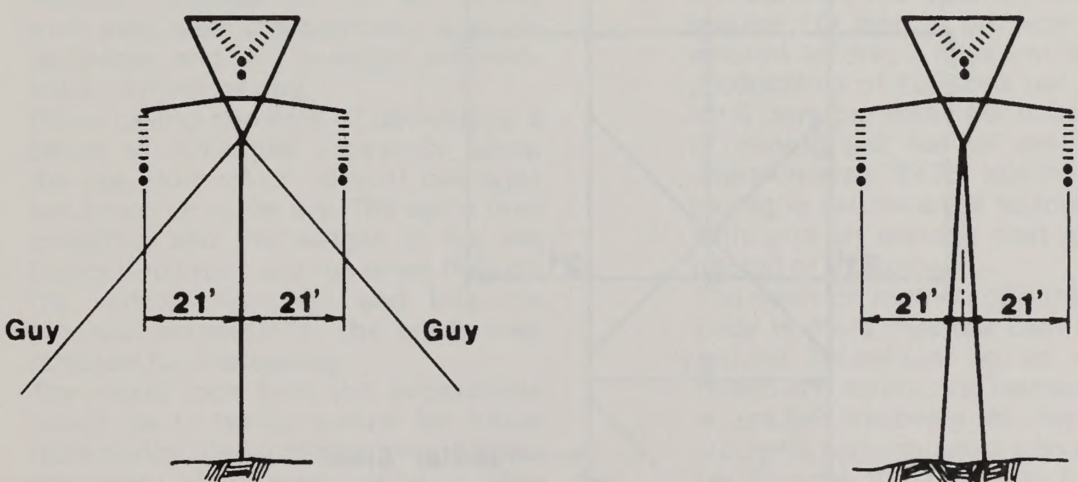
[2]Calculations assume 534 tower locations, 4 acres for one switching station, 3 acres for one materials storage yard, and an 8-foot wide access trail for entire length of right-of-way (83 acres).

[3]Tower design for some aluminum tangent structures requires 4 guy wires, each extending 60 feet from base; because the number of these structures required is not known, disturbance associated with guy wire placement was not considered in calculations.

Source: ERT EIS Team.

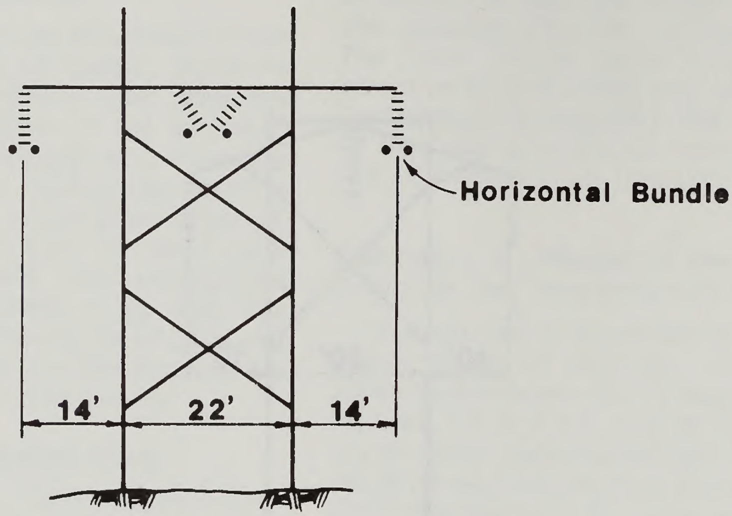


Wood K-Frame Tangent Structure

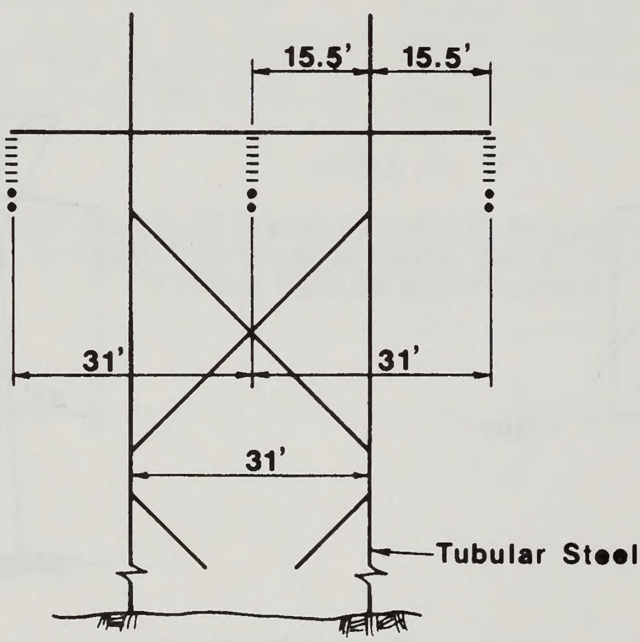


Aluminum Tangent Structures

Figure 1-6. Alternative Wood and Aluminum Transmission Line Support Structures
Source: Sierra Pacific Power Company



Concrete Tangent Structure



Steel Tangent Structure

Figure 1-7. Alternative Concrete and Steel Transmission Line Support Structures
Source: Sierra Pacific Power Company

TABLE 1-9

COMPARISON OF LAND REQUIREMENTS FOR THE PROPOSED AND ALTERNATIVE TRANSMISSION LINE CORRIDORS FOR THE NEVADA MOLY PROJECT

	Proposed	West Smoky Valley	Ft. Churchill[1]	Monitor[1]	Reese[1]
Total length (miles)	86	91	140	115	85
Miles of rugged terrain	0	0	32	---	27
Total area in corridor (acres)[2]	1,459	1,544	2,376	1,952	1,442
Number of tower locations[3]	534	565	869	714	528
Estimated area of disturbance (acres)[4]	98	103	155	128	96

[1]Alternatives which were eliminated from detailed study.

[2]Corridor width of 140 feet.

[3]Assumes average span length of 850 feet.

[4]Assumes use of 8-foot wide access trail for entire length of right-of-way and disturbance area of 20 feet by 40 feet at each tower location. Includes 3 acres for materials storage yard, 4 acres for switching station, and disturbance due to access trail use and tower site preparation.

Source: ERT EIS Team

process, numerous variations affecting each of these areas were considered. The final project description reflects many major design decisions. Alternatives to the plan were eliminated throughout the process, and are no longer under consideration by ACC.

The two most important areas of design decisions were:

- *Mining Technique.* Two systems for extracting molybdenum ore for milling were evaluated: the proposed open pit technique and the underground technique of block caving.

  Block caving consists of developing a series of horizontal crosscuts below the ore, from which vertical passages are driven up to the ore. The ore is then undercut, and the weight of the ore forces it to crush and run down through the vertical openings and into the crosscut excavations. The ore is then removed for processing.

  The waste rock from the excavations would go to waste dumps for future reclamation. Because the ore collapses downward after undercutting, a large subsidence hole would appear above the ore zone.

  The ore deposit at the ACC mine/mill complex would cave readily if undercut, but problems would be encountered in the vertical passages due to the sticky character of the ore. The ore deposit is cylindrical in shape and dips to the east at 45 to 50 degrees. Several short development levels would be required to recover the ore without significant dilution. Large segments of the ore zone would be unrecoverable by this method.

  The manpower required by this technique to produce 20,000 tons per day of ore, 7 days per week, at a productivity of 50 tons per man shift for 5 days per week, per man, would be 560 men; in comparison, the open pit mine would require 174 men to produce the same amount of ore, 7 days per week, at a productivity of 800 tons per man shift for 5 days per week per man. The cost of mining per ton of ore would be approximately $3.75; mining by block caving is estimated at 50 tons per man shift with an average cost per ton extracted of $5.50/ton.

  The open pit method of mining the ore body is more feasible than the underground technique on an economic, health and safety, and manpower basis. A greater recovery of the resource would be accomplished with an open pit because of the potential for treating lower grade ore zones in the future, as technology and operating efficiencies improve. The open pit method would involve greater overall surface disturbance; however, a smaller work force would be required and there would be fewer required services (e.g., housing). Also the open pit mine would provide more favorable health and safety conditions compared to an underground

operation, which would require substantial health and safety precautions.

- *Facility Siting.* Two basic environments are available on ACC's property for the location of the facilities complex. These are the elevated topography of the San Antonio Mountains and the alluvial fan at the base of the mountains. ACC decided to construct on the alluvial fan, as this is a less complex environment and environmental effects, as well as safety and health problems, are minimized, while economic factors are enhanced. Siting studies for the tailings pond indicated that while the tailings pond could be located in the San Antonio Mountains, there were several disadvantages associated with the high location. The first disadvantage was that the tailings would have to be pumped uphill which would require considerable amounts of energy. Another disadvantage involved the potential safety problems associated with dam failure in the mountain area. It was determined that the probability of dam failure due to extreme run-off events was substantially higher in the mountains than on the alluvial fan at the base of the mountains. Therefore, the alternative tailings pond sites in the mountains were eliminated because of additional energy requirements and related safety problems. Environmental studies indicated that the environment is similar at any point on the fan. Therefore, a design goal was to minimize acreages disturbed and achieve efficient locations for the mill and auxiliary facilities.

AUTHORIZING ACTIONS

This section identifies governmental authorization which would be required to fully implement the Proposed Action. The discussion is limited to those actions which have the effect of allowing the project to proceed as proposed.

Federal Action

- Department of Interior
  Bureau of Land Management
  Before the proposed project could occur, BLM would have to grant the right-of-way to SPPCo for the transmission line that would provide electric service to the ACC mine/mill complex.
  Environmental Protection Agency (EPA)
  EPA had to issue a permit for Prevention of Significant Air Quality Deterioration (PSD) before the mine/mill construction could begin. Anaconda submitted a PSD application to EPA Region IX on March 15, 1979. EPA granted the permit on June 6, 1979.

State Action

- Nevada Department of Conservation and Natural Resources, Division of Environmental Protection
  The State would have to issue air quality certificates for construction and operation of the Proposed Action. Application was made to the State on October 12, 1978, and necessary certificates were issued on April 5, 1979.
- State Division of Water Resources
  A water appropriation permit would be required. The State has granted a permit for two wells of 6 cubic feet per second each.
  A permit would be required to construct the tailings dam.
- Nevada Public Service Commission
  An Environmental Analysis Statement is required by Nevada Statute (NRS 704 Utility Environmental Protection Act, as amended) for electric transmission lines and their associated facilities, having a design capacity of 200kv or greater. The permitting document is a Permit to Construct and Order. This document summarizes the review process, findings, and stipulations of the agency.

INTERRELATIONSHIPS

Relationship to BLM Land Use Plans

The proposed transmission line route is located in two BLM resource areas, Shoshone-Eureka and Tonopah. The proposed transmission line would be compatible with the Management Framework Plans for the Tonopah and Shoshone-Eureka resource areas.

Relationship to Other Proposed Projects

Other preliminary development proposals involving the project area have been recently announced and, if constructed, could possibly result in overlapping impacts. When assessed with the Proposed Action these effects might increase the cumulative impacts in the study area. However, the probability of these projects being implemented is uncertain and the decision to proceed, in most cases, is not expected prior to completion of the EIS. The following

preliminary proposals are not considered in the EIS for the reasons given:

- MX Missile Program Deployment - In spite of the recently announced development of the MX missile, the effect on the study area will not be known prior to the completion of the EIS. However, it can be assumed that if the MX Missile Program is deployed within the study area or adjoining the study area, there may be competition for water resources, housing, and other resources.
- Nellis Air Force Base Demilitarization - The probability of demilitarization occurring is very low based on a preliminary investigation. Further, should demilitarization occur, the estimates currently available vary considerably regarding potential impact. No decision on this issue is expected prior to completion of the EIS.
- Mining Operations - During the scoping process, three additional mining operations which might be interested in pursuing operational status in the Big Smoky Valley were identified. These were:
  1. Cyprus Mines Corporation
  2. Smoky Valley
  3. Houston Oil and Minerals Corporation

  The possibility of these operations utilizing the proposed transmission line was recognized; however, only those projects which have been formally announced or are already under contract at the time of initiation of the EIS were considered in the cumulative impact section of the EIS.

SUMMARY COMPARISON OF IMPACTS

A summary of the environmental impacts of the Proposed Action and alternatives is presented in Table 1-10. See Chapter 3 for details of the impact analysis. Where data were not available in the Environmental Consequences chapter to quantify impacts, a qualitative description of the impact has been included.

TABLE 1-10

SUMMARY COMPARISON OF IMPACTS[1]

Proposed Action	West Smoky Alternative	No Action	Alternative Designs	Alternative Crushing/ Grinding Circuit
		AIR QUALITY		
1,600.5 tons/year of particulate (TSP) emissions. Annual TSP concentration would be 1.4 $\mu g/m^3$. Emissions would not violate any air quality standards.	Same as Proposed Action	1,656.1 tons per year of particulate (TSP) emissions. Annual TSP concentrations would be 1.5 $\mu g/m^3$. Emissions for carbon monoxide (CO) would be 446.5 tons/yr; oxides of nitrogen (NO_x) would be 3,204.4 tons/yr; and sulfur dioxide (SO_2) would be 519 tons/yr TSP. Emissions would not violate any air quality standards.	Same as Proposed Action	1,655.4 tons/yr of particulates (TSP) emissions. Annual average TSP concentrations would be 5.9 $\mu g/m^3$. Emissions would not violate any air quality standards
		GEOLOGICAL SETTING & TOPOGRAPHY		
Operation of the mine/mill complex would directly impact the existing topography; this alteration at the mine/mill site would be considered significant.	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action

TABLE 1-10—*Continued*

SUMMARY COMPARISON OF IMPACTS[1]

Proposed Action	West Smoky Alternative	No Action	Alternative Designs	Alternative Crushing/ Grinding Circuit
		SOILS		
Based on a worst-case analysis, insufficient soil material would be available for revegetation and revegetation would fail. The direct impact of soil burial would indirectly affect visual resources at the mine/mill site.	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action
		WATER RESOURCES		
Seepage from tailings pond would be approximately 400-590 acre-feet per year but would not affect ground water quality. Project would require 4,840 acre-feet per year which represents 34% of natural groundwater flow beneath mine/mill site. No significant impact to water quality or existing water uses would occur.	Same as Proposed Action but transmission line would cross seven perennial streams versus one for the proposed corridor. However, no significant adverse impacts would occur.	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action
		VEGETATION		
Permanent loss of vegetation on 2,521 acres at mine/mill complex (assuming revegetation would fail) and 87 acres of vegetation on transmission line. This loss is considered insignificant. Construction of the mine/mill complex could result in disturbance of candidate threatened and endangered species. This is considered a significant adverse impact.	Same as Proposed Action except 92 acres of vegetation would be permanently lost with construction of transmission line.	Same as Proposed Action	Same as Proposed Action or West Smoky Valley Alternative (Alternative designs could be implemented on either transmission line corridor).	Same as Proposed Action
		WILDLIFE		
Permanent and temporary losses of wildlife habitat would occur but are considered insignificant due to widespread occurrence of similar habitat in the region. Impacts to significant species would not occur.	Same as Proposed Action except corridor would disturb 22 acres of mule deer winter range. This was considered insignificant because the loss of forage would be insignificant.	Same as Proposed Action	Same as Proposed Action or Smoky Valley Alternative (Alternative designs could be implemented on either transmission line corridor).	Same as Proposed Action

TABLE 1-10—*Continued*

SUMMARY COMPARISON OF IMPACTS[1]

Proposed Action	West Smoky Alternative	No Action	Alternative Designs	Alternative Crushing/ Grinding Circuit
		CULTURAL RESOURCES		
Increased population would indirectly affect the nearby Liberty and Blue Jack Mines. Ten prehistoric and one historic sites would be directly affected by project. If affected, the sites would be salvaged and impacts to cultural resources would be considered insignificant. Historical trails or stage roads of high historic value impacted by the project would represent a significant adverse impact.	Cultural resource impacts along the transmission line corridor could result from this alternative. Three major prehistoric areas and 19 smaller areas are within the corridor and would be impacted. However, these sites would be salvaged and impacts to prehistoric resources would be considered insignificant. Two historic features, the Minnium Stage Station and Belmont-Austin Stage Coach Road would be adversely affected by the project.	Increased population would indirectly affect the nearby Liberty and Blue Jack Mine.	Same as Proposed Action or West Smoky Valley Alternative (Alternate designs could be implemented on either transmission line corridor).	Same as Proposed Action.
		VISUAL RESOURCES		
Visual quality at Mine/mill would be significantly affected visual quality. The visual contrast would exceed allowable contrast values for a VRM Class IV area. Transmission line would represent a visual intrusion in Big Smoky Valley but visual contrasts would not exceed values for VRM Class IV and V. Therefore, visual impacts associated with transmission line are insignificant.	The transmission line would exceed contrast values for VRM Class III areas. In addition, the line would adversely affect the VRM Class II area directly to the west of the corridor. The impacts would be considered significant adverse impacts.	Same as Proposed Action except visual impacts related to the transmission line would not occur.	Impact depends on structure and its location. All 4 alternate structures would be acceptable on proposed transmission line corridor. None of the structures would meet BLM restrictions if line were constructed on the West Smoky Valley Alternative.	Same as Proposed Action.
		NOISE		
Maximum noise levels at the mine (75 dB) and during construction of transmission line (40-50 dB) would be within established noise levels and would be insignificant impacts.	Same as Proposed Action	Maximum noise levels described for the Proposed Action would be the same except that additional noise would be generated by the generators. Noise levels from generators would be approximately 60 dBA, within established noise levels. Noise levels would be insignificant impacts.	Same as Proposed Action	Same as Proposed Action

TABLE 1-10—*Continued*

SUMMARY COMPARISON OF IMPACTS[1]

Proposed Action	West Smoky Alternative	No Action	Alternative Designs	Alternative Crushing/ Grinding Circuit
		RECREATION		
Public facilities would receive increased usage. Demand for limited indoor facilities would exceed capacity. Increased population base would attract new recreational opportunities. Public lands would experience higher levels of use.	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action
		LAND USE		
Project would change existing land use on 3,204 acres from open space and grazing to residential and industrial uses. The project would indirectly double the developed acreage of Tonopah. This is considered a significant adverse impact.	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action
		MINERAL RESOURCES		
Would remove approximately 150 million metric tons of molybdenum and copper ore and this would represent a significant impact.	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action
		LIVESTOCK GRAZING		
Under worst case analysis, mine/mill would result in permanent loss of 66 AUMs/year. Permanent losses of 3.2 AUMs/year would occur due to transmission line. These losses are considered insignificant.	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action

TABLE 1-10—*Continued*

SUMMARY COMPARISON OF IMPACTS[1]

Proposed Action	West Smoky Alternative	No Action	Alternative Designs	Alternative Crushing/ Grinding Circuit
		TRANSPORTATION		
An Additional 2,000 vehicle trips/day would occur during the construction phase. Proposed action would lead to a significant deterioration of service on combined U.S. 95-6 northwest of Tonopah over the entire period, temporary impacts on State Route 89 during the construction period, and on U.S. 95-6 in downtown Tonopah before 2001.	Same as Proposed Action	Same as Proposed Action but there would be an additional 3 vehicles/week leaving project area. These would further contribute to significant transportation impacts identified for the Proposed Action.	Same as Proposed Action	Same as Proposed Action
		POPULATION		
Significantly increase population by 2,195 for Nye County (25.4% over baseline) and 2,080 for Tonopah (91.2% over baseline).	Same as Proposed Action	Increase population by 2,277 for Nye County and 2,157 for Tonopah.	Same as Proposed Action	Increase population by 2,291 for Nye County and 2,171 for Tonopah
		PUBLIC FINANCIAL RESOURCES		
Property tax proceeds generated by project would produce an average of $1.7 million, annually. Increase in average annual sales tax receipts would be $206,000. There would be a short-term adverse impact resulting from the time lag between influx of population, and the generation of new revenue to support associated increases in public expenditures needed as a result of the project.	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action

TABLE 1-10—*Continued*

SUMMARY COMPARISON OF IMPACTS[1]

Proposed Action	West Smoky Alternative	No Action	Alternative Designs	Alternative Crushing/ Grinding Circuit
		EMPLOYMENT AND INCOME		
Project related employment would peak at approximately 1,000 employees and level to 400. At end of project, 400 employees would be unemployed leading to out-migration. The unemployment of 400 employees would lead to declines in the service sector employment and would lead to an out-migration of the labor force. Project would significantly benefit regional income. Construction payroll would exceed $26 million. Annual payroll would exceed $8 million.	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action
		HOUSING		
Project would create a peak demand for 951 dwelling units. Estimated supplies would only provide 198 units resulting in a shortage of 753 units. Temporary shortage of housing would be a significant unavoidable adverse impact.	Same as Proposed Action	Same as Proposed Action, but an additional 28 units would be required, raising total dwelling unit demand to 979 dwelling units. Shortfall of approximately 781 units would represent a significant unavoidable adverse impact.	Same as Proposed Action	Same as Proposed Action, but an additional 33 units would be required, raising total dwelling unit demand to 987 dwelling units. Shortfall of approximately 786 units would represent an unavoidable adverse impact.
		ATTITUDES AND LIFESTYLES		
Disruption of existing lifestyles and possible friction among social groups could result with increased population. Principal lifestyles would change as economy changed from tourism and agriculture to a more industrialized economy based primarily on mining.	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action	Same as Proposed Action

CHAPTER 2

AFFECTED ENVIRONMENT

INTRODUCTION

This chapter describes the environmental components which would be affected by the Proposed Action and alternatives. In keeping with the directives in Section 1502.15 of the National Environmental Policy Act (NEPA) regulations for Environmental Impact Statements (EISs), the descriptions presented are brief and commensurate with the anticipated magnitude, duration, and intensity of impacts on each component. Material is presented so that the reader may understand how the significant impacts of the Proposed Action and alternatives would occur; an encyclopedic description of the environment of the project region has intentionally been avoided.

Material presented in the chapter was summarized from a series of technical reports prepared by Environmental Research and Technology, Inc. (ERT) as background material for the EIS. The affected environment chapter of each of the technical reports contains a more comprehensive description of the environments of the project region and may be referred to if additional information is desired. A list of the technical reports and the topics covered in each is presented in Table 2-1.

CLIMATE

Climatic data are important to a general understanding of the affected environment and thus are briefly summarized. Results of meteorological investigations at the mine/mill site and a more detailed presentation of regional data are presented in the ERT Air Quality Technical Report (1980).

The climate of the project vicinity is characteristic of the mid-latitude desert and steppe climate of the western Great Basin Region of the southwestern United States. Frequent changes of weather, prevailing westerly winds, generally arid climate, and low humidities are typical. Seasonal variation in climate is very pronounced with cool, dry weather and cold nights occurring from November to April and sunny, warm, and dry weather from May to October (Houghton et al. 1975). Most of the region experiences a large diurnal temperature range caused by bright and abundant sunshine rapidly warming the relatively thin dry air during daylight hours, followed by rapid cooling after sunset. Daily range in temperatures during all seasons may be as much as 40° F and frequently exceeds 50° F during the fall season (Rush and Schroer 1970). Maximum daily temperatures exceed 90° F routinely during the summer months and minimum temperatures plummet well below zero during the winter season. The average percentage of possible sunshine is about 80 (Houghton et al. 1975) and the average growing season is approximately 140 days.

Monthly mean precipitation data indicate a generally even distribution of precipitation throughout the year. This results from the combination of winter storm contributions from October through April and thunderstorm contributions from July through September. The average frequency of thunderstorm activity is 10 to 15 days per year. The average number of days per year with measurable precipitation (.01 inch or more) is approximately 38. The maximum precipitation to be expected within a 24-hour period on an average of once every 50 years is 2.0 to 2.4 inches (Houghton et al. 1975).

Annual precipitation amounts vary on the floor of the Big Smoky Valley from 3.3 to 5.5 inches. In the mountains surrounding the valley, annual precipitation amounts in excess of 16.7 inches occur. Annual snowfall amounts in the region are relatively light and vary from less than 10 inches south of Tonopah to over 80 inches in the Toiyabe and Toquima Mountains (Houghton et al. 1975).

Surface wind speeds are generally light throughout the region and wind direction characteristics are primarily the result of interaction between local topography and strong diurnal heating and cooling. Analysis of four-year wind speed and direction distributions for Nye County airport data (ERT Air Quality Technical Report 1980) shows an average wind speed of 7 miles per hour and the dominant wind directions aligned with the surrounding terrain. The 25-year estimated fastest wind is in excess of 60 miles per hour (Houghton et al. 1975).

TABLE 2-1

LIST OF ERT TECHNICAL REPORTS REFERENCED AS BACKGROUND MATERIAL FOR THE EIS

Technical Report	Topics Discussed
Air Quality	Air Quality; Climate
Cultural Resources	Cultural Resources
Geology and Groundwater	Geology; Groundwater; Topography; Mineral Resources
Noise	Noise
Proposed Action and Alternatives	Proposed Action; Alternatives to Proposed Action
Socioeconomic	All "Human Resources"; Social Conditions; Economic Conditions; Wilderness; Recreation; Land Use; Livestock Grazing; Agriculture; Transportation
Soil	Soils; Revegetation Guidelines
Surface Water	Surface Water
Vegetation	Vegetation
Visual Resources	Visual Resources
Wildlife	Wildlife

Source: ERT EIS Team.

AIR QUALITY

Since the study area is sparsely populated and generally undeveloped, scattered population centers and industry are not large enough to generate significant quantities of air pollutants. Light wind speed and the abundant sunshine imply frequent unstable conditions and good atmospheric dispersion throughout most of the year.

The existing air quality of the region is excellent. Periodic sampling for nitrogen oxides and sulfur dioxide conducted by the Nevada State Air Quality Office (Serdoz, personal communication 1979) indicates the absence of detectable background concentrations for these pollutants. No data for photochemical oxidants are available for the area. Inquiries on background levels for atomic radiation were not conducted. The largest source of pollutants in the study area is naturally and mechanically generated particulate matter.

The state of Nevada has monitored total suspended particulate (TSP) concentrations in the Tonopah area since 1972. The Tonopah monitor consistently measures TSP concentrations far below Federal and state standards. Annual geometric mean TSP concentrations averaged 21 micrograms per cubic meter ($\mu g/m^3$) for the period of 1972 through 1977 (ERT Air Quality Technical Report 1980). These are well below the allowable concentrations of 60 $\mu g/m^3$ and 75 $\mu g/m^3$ established respectively by the State of Nevada and U.S. Environmental Protection Agency.

In the summer of 1978, ACC established a monitoring network to measure TSP concentrations at the mine/mill site as required by U.S. Environmental Protection Agency regulations for Prevention of Significant Deterioration (PSD). The field sampling has been conducted since July 1978 at four meteorological stations in the mine/mill complex area. Data for the sampling year October 1978 through September 1979 are presented in Table 2-2. The data indicate a combined annual geometric mean concentration for the area of approximately 16.1 $\mu g/m^3$. The distribution of TSP values by season indicates considerable variation of concentrations between winter and summer. This is probably the result of the increased frequency of dust devils (small dust storms) in the warmer months and stable air and wet or frozen ground conditions in the winter months. No significant correlation could be found for TSP concentrations and wind speed. The largest contributing factor to particulate loading in the atmosphere appears to be the condition of the ground. Disturbed soils and lack of vegetative cover seem to result in higher TSP values. All the monitoring sites had similar ground conditions and, as expected, the data suggest little

TABLE 2-2

SUMMARY OF TSP CONCENTRATIONS AT THE PROPOSED NEVADA MOLY MINE/MILL COMPLEX FOR THE ONE-YEAR PERIOD OCTOBER 1978 THROUGH SEPTEMBER 1979

	TSP Concentrations ($\mu g/m^3$)				
	Fall	Winter	Spring	Summer	
	9/79	12/78	3/79	6/79	
	10/78	1/79	4/79	7/79	Annual
Site	11/78	2/79	5/79	8/79	10/78-9/79
North	13.4	4.8	20.4	23.4	15.8 (54)[1]
East	15.1	6.2	17.5	18.3	14.7 (43)
South	13.2	9.0	12.7	29.4	12.8 (29)
West #1	12.9	6.4	21.9	23.6	16.6 (49)
West #2	17.5	6.8	24.9	22.7	18.8 (52)
Average	14.5 (39)	6.7 (67)	20.9 (59)	22.7 (63)	16.1 (277)

Maximum: 82.3 at West #2 on 4/9/79

Minimum: 0.4 at South on 12/4/78

[1]( ) indicates number of samples.
Source: ERT Air Quality Technical Report 1980

difference in TSP concentrations between sites.

GEOLOGIC SETTING

Detailed description of the geologic setting of the project region is included in the ERT Geology and Groundwater Technical Report (1980) and is not repeated here because no significant impacts to geologic setting were identified in the impact analysis. Seismicity data, however, are discussed below because of the potential for earthquake activity within the project region.

The Proposed Action and alternatives would be located within the western portion of the Great Basin physiographic province. This region is considered a Zone 3 seismic risk area. Such an area could expect major destructive earthquakes (NOAA 1973). A summary of major seismic events in the region is presented in Table 2-3. The epicenter of the Cedar Mountains earthquake of 1932 (7.3 magnitude) (Table 2-3) is located approximately 49 miles northwest of the mine/mill site (Sargent, Hauskins, and Beckwith 1978).

Within the Big Smoky Valley itself, numerous faults occur. Systems of faults run along the bases of the mountains, trending parallel with the mountains and forming the boundary between the consolidated rocks of the mountains and the alluvial deposits of the valley (Kleinhampl and Ziony 1967; Hydro-Search 1975a; Rush and Schroer 1970). The mine/mill site is bisected by such a fault (the Liberty Fault) which has been determined to be inactive.

Some of the faults in the Big Smoky Valley are active (Slemmons et al. 1964). Based on aerial photointerpretation, activity has been detected along a major fault system on the western side of the upper end of the valley and along a smaller fault near the southern end of the valley (Sargent, Hauskins, and Beckwith 1978).

TOPOGRAPHY

The Big Smoky Valley is a 2,926 square-mile basin (Rush and Schroer 1970) trending north-northeast to south-southwest and surrounded by several mountain ranges. The major ranges which serve as the western and eastern boundaries are the Toiyabe and Toquima ranges, which reach elevations in excess of 11,000 feet above sea level or over 5,500 feet above the valley floor. The northern end of the Big Smoky Valley is marked by the Simpson Park Mountains. The southern extent of the valley is delineated by the San Antonio Mountains, Lone Mountain, the Monte Cristo Range, and Cedar Mountain (See Map 1-1). These mountains attain elevations from 7,000 to 9,000 feet above sea level or 1,500 to 3,500 feet above the valley floor. The Big Smoky Valley is steepest near the

TABLE 2-3

MAJOR SEISMIC EVENTS IN THE REGION OF THE NEVADA MOLY PROJECT

Date	Epicenter Location	Intensity[1] Magnitude	Area[2] (mi^2)	Remarks
1845 (?) poss. 1852	Stillwater area (?) poss. Pyramid Lake	greater than 7	unknown	Report based on boyhood recollection of local inhabitant. Shock knocked down people, shook river bank, may have diverted river.
Mar. 26, 1872	Owens Valley, CA	X-XI approx. 8	640,000	23 persons killed, 60 injured in Lone Pine; 52 houses (mostly adobe) destroyed. Faulting along east side of Owens Valley extended for more than 41 mi; scarps up to 23 ft high.
Oct. 2, 1915	Pleasant Valley	X	500,000	Faulting for 20-25 mi along west face of Sonoma Range, scarps up to 13 ft high. All buildings destroyed in Kennedy; chimneys toppled, walls cracked in Winnemucca. Mine tunnels caved in; water tanks fell, roads cracked.
Dec. 20, 1932	Cedar Mountains	X 7.3	500,000	Created fissures; zone of rupture 37 mi long, 4-9 mi wide. Chimneys toppled in Mina and Luning. Boulders dislodged from hillsides. Groundwater flow changed.
Dec. 16, 1954	Fairview Peak and Dixie Valley (2 events 4 min. apart. Fairview Peak approx. 34 mi south of Dixie)	X 7.1; 6.8	200,000	These two earthquakes produced two zones of surface rupture; southern (Fairview) zone 30 mi long, 6 mi wide; northern zone (Dixie) 25 mi long, 3 mi wide. Highways cracked, groundwater flow changed.

[1]Roman numeral represents intensity as measured on the Modified Mercalli Intensity Scale. Arabic number represents magnitude as measured on the Richter Scale.

[2]Area represents the area over which the effects of the earthquake were felt. Figures given are estimates; in many cases (particularly in the 1800s), information on the extent of earthquake effects is very sketchy, relying on the recollections of a few individuals in sparsely populated areas. The low population density also accounts for the limited damage to property.

Sources: National Oceanic and Atmospheric Administration. 1973. Earthquake history of the United States. NOAA Environmental Data Service Publication 41-1.
Ryall, A. 1977. Earthquake hazard in the Nevada region.
Bulletin of the Seismological Society of America. Volume 67, no. 2, April.

mountain ranges and becomes nearly flat in the center.

The proposed mine/mill complex would be located along the western edge of the San Antonio Mountains. The open pit mine would be located in the steep foothills. The mill facility would be located on the gradually sloping alluvium at the base of the mountains.

SOILS

The affected area for the soils resource includes the site of the mine/mill complex and the locations of the proposed and alternate transmission line corridors. The ERT Soils Technical Report (1980) presents soils maps for the mine/mill complex and transmission line alternatives, detailed soil series descriptions, and results of laboratory analyses of soils at the mine/mill site.

Detailed information on soils for the transmission line alternative is not presented here because the impact analysis concluded that transmission line construction would not significantly affect soils. The majority of the soils on either transmission line route are classed physiographically as soils of Valley Fill, Outwash Plains, and Alluvial Fans. These soils are well drained to excessively drained with surface layers which are gravelly coarse, moderately coarse, or medium textured. Formation occurred in alluvium primarily from volcanic rocks with admixtures of limestone and shale. Generally these soils are not suited for irrigated cropland though some have been irrigated. These associations are poorly suited for range seeding and are primarily used for grazing and wildlife habitat. Slopes are level to moderate and erosion hazards range from slight to high (ERT Soils Technical Report 1980).

Four principal soil series overlie the area of the mine/mill complex. Map 2-1 shows soil mapping unit boundaries in relation to proposed project components. The ERT Soils Technical Report (1980) provides detailed discussion of the soils, including results of laboratory analyses. Brief descriptions of each unit are presented here.

The Bluewing gravelly sandy loam (5 percent slopes) occurs in sand and gravel alluvium on upland flats and alluvial fans with incised channels. This soil is deep with somewhat excessive drainage, has 30 to 60 percent gravels throughout the profile, and has rapid permeability. The effective rooting depth is about 60 inches. The pH ranges from 7.9 to 8.4, generally increasing with depth. Groundwater is deep, water-holding capacity low, and the erosion hazard is rated as slight. Textures are primarily gravelly and very gravelly sandy loam to very gravelly sand. Approximately 6 to 12 inches of this soil in the tailings dam area would be stripped and stockpiled for use in revegetation. The affected area would be 61 acres.

The Koyen loamy sand (2 to 3 percent slopes) is a deep, well to somewhat excessively drained soil that occurs on alluvial fans. Textures range from loamy sand at the surface to sandy loams and gravelly sandy loams to 60 inches with 40 percent surficial gravels and 20 percent gravel and cobble accumulation from 20 to 60 inches. The pH range is 7.8 to 8.2, increasing slightly in the lower horizons. Groundwater is deep, erosion hazard is moderate, and the effective rooting depth is about 60 inches. This soil is the only soil at the site with high water-holding capacity.

The Pintwater gravelly sandy loam (35 to 78 percent slopes) occurs on steep ridge sideslopes and is forming in hard rock parent materials. This soil is shallow, well to excessively drained, has deep groundwater, moderately rapid permeability, and has a low available water capacity. The soil texture is gravelly sandy loam to bedrock (20 inches) and has 80 percent surface gravels and 40 percent subsurface gravels from 6 to 20 inches. Effective rooting depth is 17 to 20 inches. The pH ranges from 8.0 to 7.9 in the profile. The erosion hazard is moderate. Rock outcrops form a significant portion of the mapping unit. An identified significant mapping inclusion (less than 30 percent) consisting of moderately deep to deep soil was identified on lower sideslopes and toeslopes within the unit.

The Stumble loamy sand and Stumble sand (2 to 3 percent slopes) are somewhat excessively drained and occur on alluvial fans. These soils are deep with loamy sand and sand profile textures and exhibit 10 percent surface gravels and 5 percent gravels at depths greater than 26 inches (Stumble loamy sand). The pH ranges from 7.7 to 8.3, generally increasing with depth. Groundwater is deep, available water capacity is low to moderate, and wind erosion hazard is rated high. The effective rooting depth is about 60 inches. The Stumble series covers 94 percent of the tailings pond area and would be the primary soil to be stockpiled for use in revegetation.

WATER RESOURCES

Surface water resources of the project area are described in detail in the ERT Surface Water Technical Report (1980). As discussed there and in Chapter 3, the Proposed Action and alternatives would not significantly affect this resource. Therefore, only a limited discussion is warranted here.

At the mine/mill complex, surface water resources are characterized by their scarcity. With the exception of Peavine Creek, a small intermittent stream west of the complex, and Liberty Spring, a small spring south of the complex, localized surface water discharge occurs only for short periods of time during high-intensity thunderstorms. Little evidence of stream flow activity beyond the mountain canyons exists at the complex. The routes of the transmission line corridors also are characterized by a relative scarcity of surface waters. Most of the stream flow in the Big Smoky Valley is produced from snowmelt in the Toiyabe and Toquima ranges. However, most of the perennial streams at the mountain front become intermittent and ephemeral as they approach the valley floor, due to rapid infiltration into the alluvium. Of the streams crossed by the proposed transmission line alignment, only one, Moore's Creek is perennial at the crossing. Seven of 23 streams or canals crossed by the West Smoky Valley transmission line corridor are perennial: Birch Creek, Santa Fe Creek, Kingston Creek, Timblin Canal, Summit Creek Collector Canal, Twin Rivers Canal, and Love Canyon Aqueduct. (ERT Surface Water Technical Report 1980).

Groundwater resources of the project region are considered to be of greater significance because they would be the source of water for the mine/mill complex. The groundwater resources of the project region are characterized by the arid climate and low rainfall conditions. Most groundwater is obtained from wells into the unconsolidated alluvial aquifers which fill the basins. In some areas, groundwater is obtained from springs along the boundaries between permeable alluvium and less permeable formations, or along faults (Hunt 1974).

The Big Smoky Valley is filled with alluvial deposits reaching a maximum thickness of several thousand feet (Rush and Schroer 1970). In the northern part of the valley, the saturated alluvium holds an estimated 5,000,000 acre-feet of groundwater; in the southern part (the Tonopah Flat) an estimated 7,000,000 acre-feet of water are stored in the alluvium (Rush and Schroer 1970). The primary source of recharge for the alluvial aquifer is precipitation.

Outflow of water from the northern part of the Big Smoky Valley is mostly in the form of evapotranspiration by phreatophyte vegetation (plants which send their roots down to the water table) (Rush and Schroer 1970; Hunt 1974). In the Tonopah Flat area, approximately half of the outflow results from evapotranspiration; the other half is thought to be groundwater outflow southward to Clayton Valley (Rush and Schroer 1970). Groundwater flow throughout the Big Smoky Valley is generally north to south (Hydrosearch 1975a). Table 2-4 shows the groundwater budget for the Big Smoky Valley.

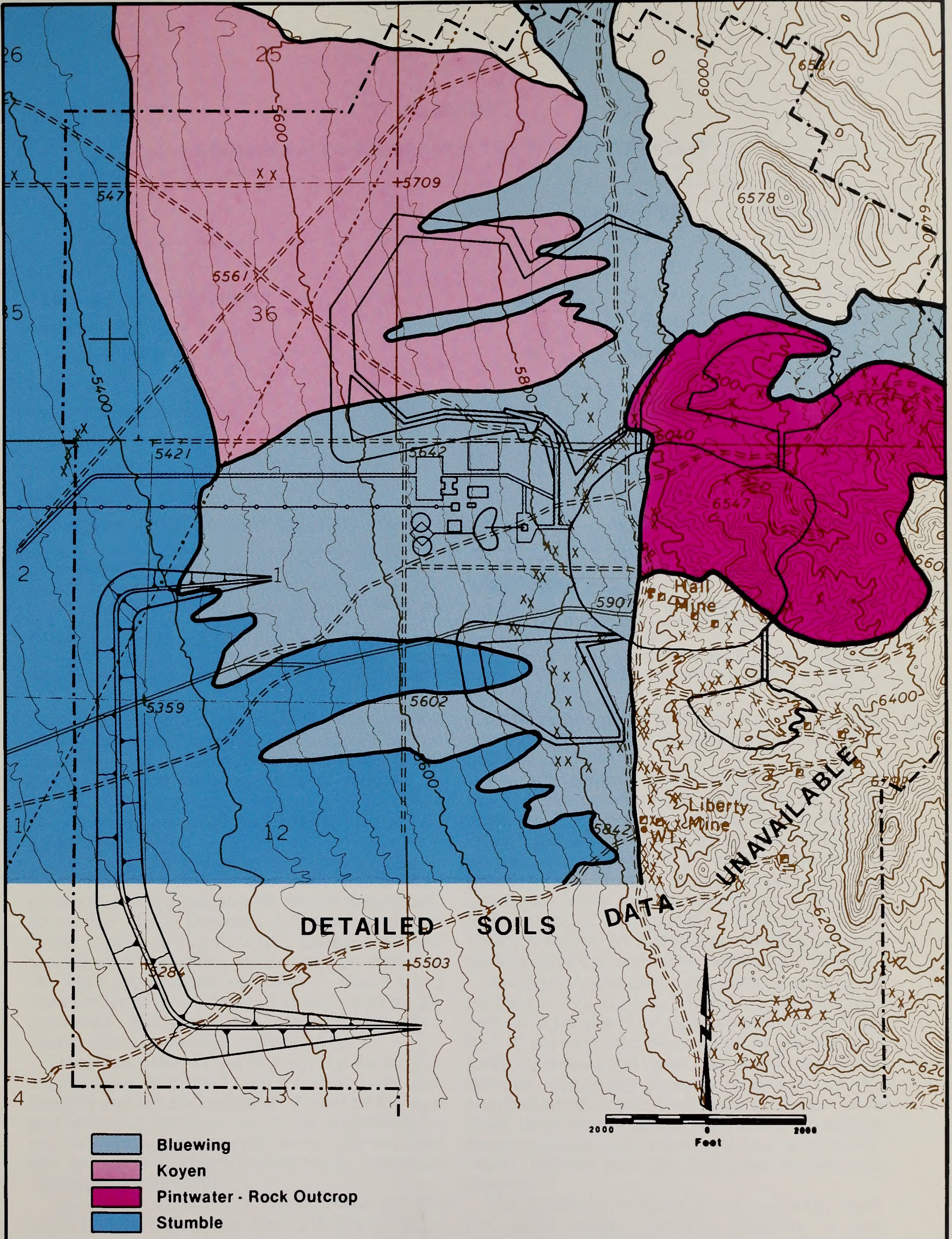
Throughout most of the Big Smoky Valley, the transmissivity of the alluvium is thought to be less than 50,000 gallons per day per foot, except in the area between Round Mountain and San Antonio Ranch, where it may exceed 100,000 gallons per day per foot (Rush and Schroer 1970). In areas where playa deposits are present (such as in the southern end of Tonopah Flat), lower transmissivities would be expected due to the fine grain size of these Pleistocene Lake deposits (Rush and Schroer 1970). The estimated total discharge of springs in the Big Smoky Valley is at least 5,000 acre-feet per year (3,000 gallons per minute) (Rush and Schroer 1970).

The western portion of the mine/mill site is underlain by thick deposits of valley-fill alluvium. Driller's logs for two wells in the vicinity indicate that the thickness of the alluvium increases towards the center of the valley. In a 2-mile distance (moving east to west) the thickness of alluvium increases from 1,270 feet to 1,596 feet (Hydrosearch 1975b). These elevations correspond to depths below the surface of 276 feet and 589 feet for the two wells. It is estimated that the elevation of the water table is relatively stable, fluctuating only a few feet (Hydrosearch 1975a). The transmissivity of the alluvial aquifer is estimated to be 52,800 gallons per day per foot (Hydrosearch 1975b). Specific capacity of the aquifer was rated at 10.67 gallons per minute per foot. An estimated 12,500 acre-feet per year flows past the mine/mill complex property.

The groundwater from two wells on and near the mine/mill complex is of good quality based on specific electrical conductance of 370 to 405 micromhos per centimeter at 24° C and total dissolved solids of approximately 300 milligrams per liter (Hydrosearch 1975b). The water is classified as soft and of sodium bicarbonate character (Hydrosearch 1975b). Results of inorganic chemical analyses on groundwater indicate that water from both wells meets the drinking water standards of the U.S. Department of Health and the Nevada State Department of Health (Hydrosearch 1975b).

VEGETATION

The Nevada Moly Project would be constructed in the Saltbush-Greasewood and Great Basin Sagebrush vegetation communities delineated by Kuchler (1975). These communities are widespread in the valleys and basins between mountain ranges in western



MAP 2-1 Soils Map For The Nevada Moly Mine/Mill Site

TABLE 2-4

GROUNDWATER BUDGET FOR THE BIG SMOKY VALLEY

		Northern Part	Tonopah Flat
Inflow:			
Recharge from precipitation		65,000[1]	12,000
Subsurface inflow		None	2,000
Total inflow	(1)	65,000	14,000
Outflow:			
Evapotranspiration		64,000	6,000
Subsurface outflow		None	* [2]
Total outflow	(2)	64,000	6,000
Imbalance: (1) - (2)		1,000	8,000[3]
Value selected to represent both inflow and outflow:		65,000	14,000

[1]All quantities in acre-feet per year.

[2]No direct estimate made; see footnote below.

[3]May be equal to subsurface outflow to Clayton Valley previously estimated to be about 13,000 acre-feet per year (Rush, F. E. 1968. Water resources appraisal of Clayton Valley - Stonewall Flat area, Nevada and California. Nevada Department of Conservation and Natural Resources, Water Resources Reconnaissance Series Report 45).

Source: F. E. Rush and C. V. Schroer. 1970. Water resources of Big Smoky Valley, Lander, Nye and Esmeralda Counties, Nevada. Nevada Department of Conservation and Natural Resources, Division of Water Resources. Bulletin No. 41. 84 pp.

Nevada. On a more local scale, vegetation types on the mine/mill complex correspond to the Shadscale type (basin floors) and the Black Sagebrush type (shallow soils of mountains, mesas, and foothills) of Beatley (1976). These communities are used for livestock range and as wildlife habitat.

Dominant vegetation types in the vicinity of the proposed and alternate transmission line corridors are Big Sagebrush, Black Sagebrush, Shadscale, Black Greasewood, Grassland, and Other Desert Shrub (U.S.D.I., Bureau of Land Management no date, a). Vegetation types of the Big Smoky Valley are shown in Map 2-2 and the number of miles crossed in each type by the proposed and alternate transmission line routes are summarized in Table 2-5.

Livestock graze in the Big Smoky Valley and surrounding mountain ranges (see Livestock Grazing section of Chapter 2). Based on the size and stocking rates of the major allotments in the valley, approximately 27 acres are required per animal unit month (Deschamp, personal communication 1979).

Two major vegetation types occur on the mine/mill complex: the Saltbush-Black Sagebrush type on mountain slopes and the Galleta-Saltbush type on alluvial areas (See ERT Vegetation Technical Report 1980). There is a distinct boundary between the two vegetation types along the mountain slope-alluvium boundary.

Average ground cover in July 1978 field studies was estimated to be 22 percent in the Saltbush-Black Sagebrush type. Approximately 16 percent was provided by eleven species of shrubs and 6 percent by twelve species of grasses and forbs. Black sagebrush and shadscale were the dominant shrub species, together contributing over 75 percent of the shrub stratum ground cover. Cheatgrass and galleta were the dominant herbaceous species.

Average ground cover was estimated to be 25 percent in the Galleta-Saltbush type. Ten percent was provided by eight species of shrubs, and 15 percent by nine species of grasses and forbs. Greasewood was the dominant shrub species, contributing nearly 50 percent of the shrub stratum cover. Greasewood shrubs were short (less than 1 meter tall). Other important shrub species were shadscale and gray horsebrush. Galleta was the dominant herbaceous species.

The mine/mill complex area is currently used for cattle range. Carrying capacity is low (approximately 38 acres per animal unit month) because of the sparse vegetation cover and infrequent rainfall in the region.

TABLE 2-5

SUMMARY OF VEGETATION TYPES CROSSED BY PROPOSED AND ALTERNATE TRANSMISSION LINE ROUTES, NEVADA MOLY PROJECT

	Proposed Corridor		West Smoky Valley Alternative Corridor	
Vegetation Type	Miles Crossed	Acreage[1]	Miles Crossed	Acreage[1]
Greasewood	59	1,001	23	390
Big Sagebrush	2	34	17	288
Black Sagebrush	2	34	5	85
Shadscale	21	356	42	713
Other Desert Shrub	2	34	2	34
Grassland	--	--	2	34
	86	1,459	91	1,544

[1]140-foot right-of-way. The entire right-of-way would not be disturbed.
Source: ERT EIS Team.

There are presently no plant species from Nevada listed by the U.S. Fish and Wildlife Service (FWS) as threatened or endangered. However, a number of species are of concern and are being reviewed for future consideration for proposal to the list of threatened and endangered species. Twenty plant species being thus considered occur in the project vicinity, according to the FWS (1980). These candidate plants are not currently afforded any official protection by the FWS or State of Nevada, but may eventually gain status as a result of the review procedure. The BLM treats candidate species on public lands as if they were on the official list.

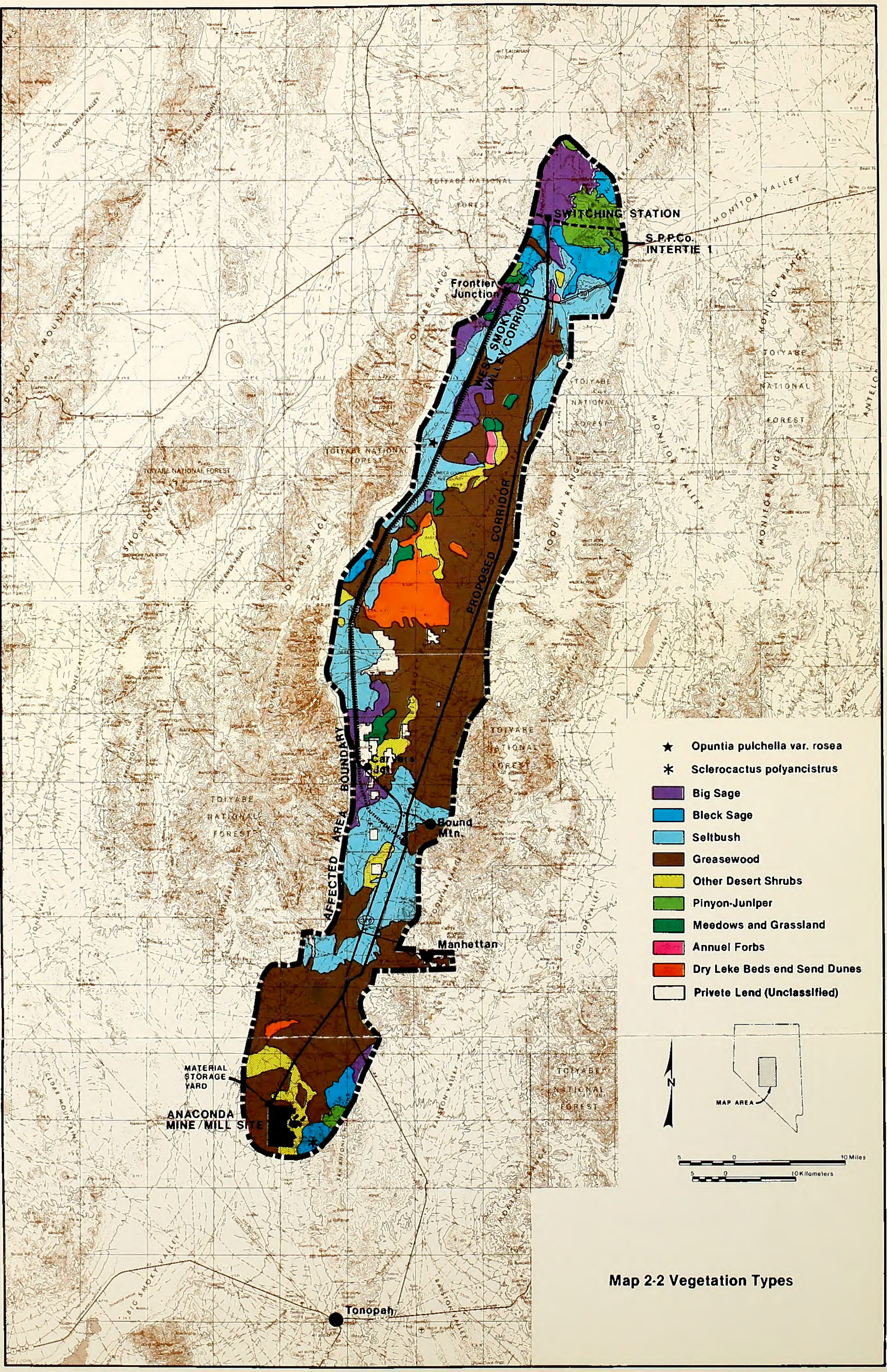
Nine of the 20 candidate species do not occur in habitats affected by the proposed project activities. General habitat descriptions for these species are presented in Appendix B. All are known to occur only within the pinyon-juniper vegetation type, which within the project site boundaries, is restricted to the upper elevations of the Toiyabe and Toquima Ranges.

The remaining eleven species may occur in habitats affected by proposed project activities. The species and general habitat characteristics are listed in Table 2-6. Of these eleven, known locations for only two coincide closely with proposed project activities. Prickly pear (*Opuntia pulchella* var. *rosea*) has been collected near the West Smoky Valley alternative transmission line corridor, and a plant believed to be fishhook cactus (*Sclerocactus polyancistrus*) was found along the Liberty Springs Road south of the mine/mill site (Map 2-2). The remaining nine species in Table 2-6 are considered to occur potentially at the mine/mill or along a transmission line corridor, based on the limited information available on habitat preferences.

WILDLIFE

As described in the vegetation section, the Proposed Action and alternatives would be constructed in areas characterized by low desert shrub vegetation: the Saltbush-Greasewood community and the Great Basin Sagebrush community (Kuchler 1975). On the floor of the Big Smoky Valley, the typical wildlife habitat is described as open stands of low and dwarf shrubs. Trees are virtually absent, water is a limiting factor in many areas, and wildlife habitat is limited by its compositional and structural homogeneity. The adjacent Toiyabe and Toquima mountains add diversity to the habitat because of the presence of pinyon-juniper vegetation, frequent stands of aspen, and occasional rock outcrops or escarpments.

Typical species of the valley area include: rodents such as deer mice, white-tailed antelope squirrel, desert woodrat, and several species of kangaroo rat; rabbits and hares such as blacktail jackrabbit and desert cottontail, reptiles like zebra-tailed lizard, desert short-horned lizard, and sagebrush lizard; mammalian predators such as coyote and kit fox; raptorial birds like golden eagle, prairie falcon, and common raven; and songbirds such as black-throated sparrow, horned lark, Say's phoebe, loggerhead shrike, and sage thrasher (Yocum et



Map 2-2 Vegetation Types

TABLE 2-6

LIST OF CANDIDATE THREATENED AND ENDANGERED PLANT SPECIES WHICH POTENTIALLY OCCUR ON THE NEVADA MOLY MINE/MILL COMPLEX OR TRANSMISSION LINE CORRIDORS

Asclepias eastwoodiana	Low alkaline clay hills and rocky slopes of pinyon pine; red sand. Central Nevada (Nye and Lander counties) and Utah[1].
Astragalus callithrix	Semi-stabilized dunes or deep sandy soil in sagebrush valleys; 5,100-5,200 feet; known only from a small area between Quinn Canyon and Hot Creek Ranges, northeast Nye County.
Astragalus pseudiodanthus	Dunes and sandy flats, often with Bailey greasewood and galleta; at 5,500 feet; in vicinity of Tonopah, west and northwest Nye County, Nevada[2].
Astragalus serenoi var. *sordescens*	Gentle slopes and flats among low sage; north-central Nye County; pinyon-juniper zone with *Artemisia nova;* dry desert soil, level slopes[3].
Astragalus uncialis	Dry knolls and gullies, in sandy or gravelly alkaline soils derived from pulverized limestones; 5,200-6,050 feet; known only from foothills of White Pine and Pancake Ranges, northeast Nye County[2].
Coryphantha vivipara var. *rosea*	Sandy soil[4].
Machaeranthera leucanthemifolia	Disturbed burns, washes; brush communities; gravelly soil; outwashes; deep gullies; 2,100-8,500 feet[3].
Opuntia pulchella	Alluvial bottoms at moderate elevations[5].
Penstemon arenarius	Loose sand; approximately 28 miles east of Tonopah[6].
Sclerocactus polyancistrus	Chiefly on mesas, deserts of Nevada and California[3].
Sphaeralcea caespitosa	Gravelly sandy soil, with shadscale; shallow soil, mixed desert shrub habitat; shallow, sandy or gravelly gentle slopes; level land and slight draws[3].

[1]Woodson, E. 1954. North American species of *Asclepias*. Annals of the Missouri Botanical Garden 41:165-166.

[2]Barneby, R. C. 1964. Atlas of North American *Astragalus*. Volumes I and II. Memoirs of the New York Botanical Garden. Volume 13. 1188 pp.

[3]Pinzl, A. September 1979 and February 1980. Curator, Nevada State Museum. Personal communication.

[4]Britton, N. L. and J. N. Rose. 1922. The Cactaceae. Volume IV. Dover Publications, Inc., New York 318 pp.

[5]Benson, L. 1950. The Cacti of Arizona. University of Arizona Press, Tucson. 135 pp.

[6]Keck, D. 1940. Studies in *Penstemon* VII. American Midland Naturalist 23(3):594-616.

[7]Britton, N. L. and J. N. Rose. 1922. The Cactaceae. Volume 3. Dover Publications, Inc., New York. 258 pp.

al. 1958; ERT Wildlife Technical Report 1980). Adjacent mountains support many of these same species, as well as mule deer, mountain lion, goshawk, Cooper's hawk, and a variety of other species.

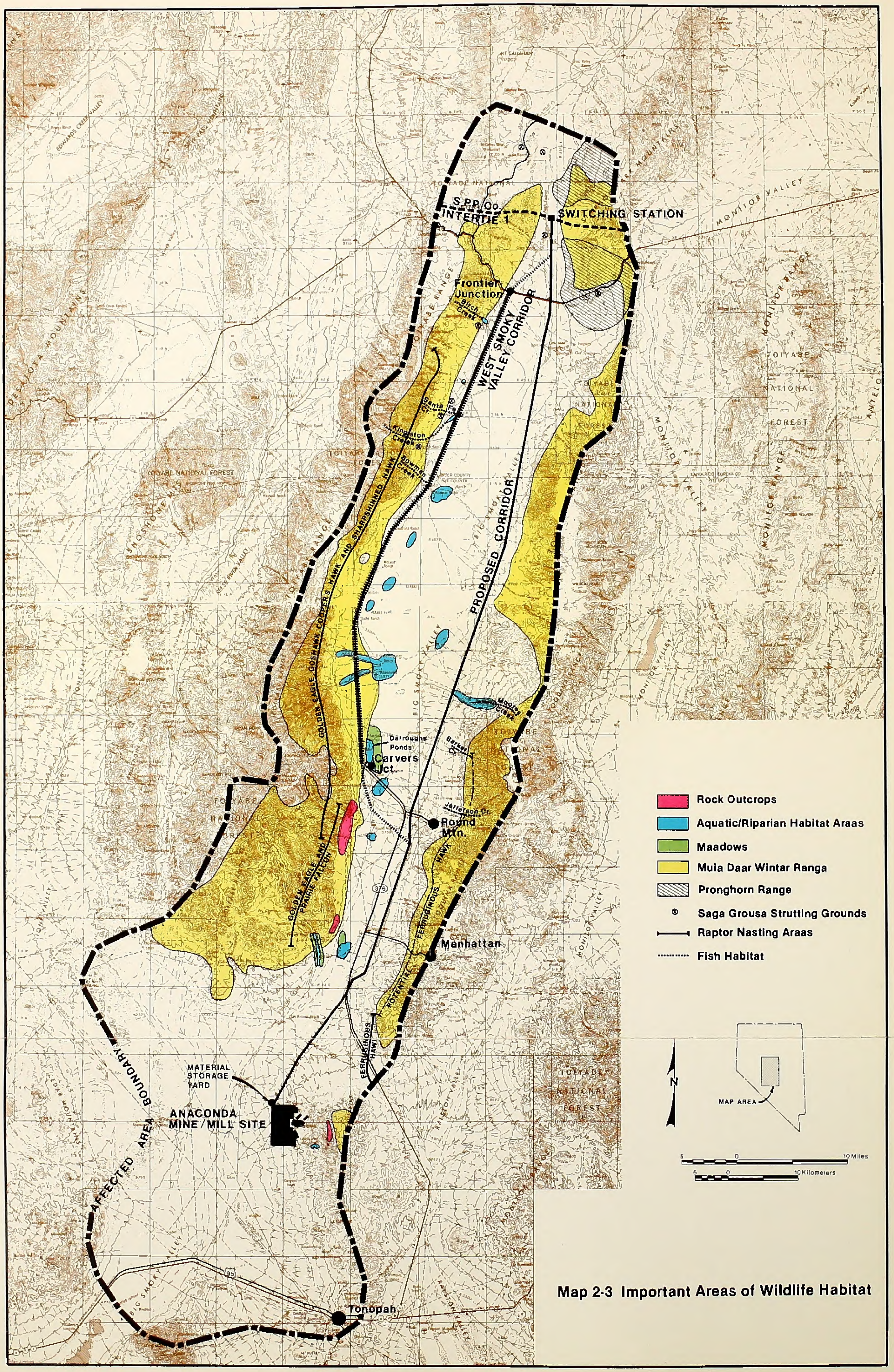
The ERT Wildlife Technical Report (1980) provides a detailed discussion of the wildlife species and habitats of the project area. The report focuses on the desert shrub habitat of the Big Smoky Valley, but also includes the pinyon-juniper and aspen habitat of the adjacent mountain ranges. The report summarizes results of intensive field investigations at the mine/mill site, results of field reconnaissance of the transmission line corridors, reviews of existing information on file in BLM and Nevada Department of Wildlife (NDW) offices, and results of discussions with wildlife biologists of the BLM and NDW.

Based on the technical report and discussions with wildlife biologists familiar with the area (Herron, personal communication 1980; Sykes, personal communication 1980; Mason, personal communication 1980), the significant wildlife species and habitats of the project region were defined. Significant wildlife habitats in the area potentially affected by the Proposed Action and alternatives are shown on Map 2-3. These areas are a mix of (1) areas of importance to a species; and (2) habitat types that

are of crucial importance to a variety of species. Significant habitats are briefly discussed below:

- *Pronghorn Winter and Summer Range* - Two areas at the northern edge of the Big Smoky Valley are used by a small herd (approximately ten) of pronghorn (U.S.D.I., no date, b). Pronghorn are few in number in Nevada so the range of this small herd is important (Map 2-3).
- *Sage Grouse Strutting Grounds* - Mapped strutting grounds and surrounding nesting habitats are essential habitat for breeding success of this important gamebird. One ground at the north end of the transmission line is located within one-half mile of the proposed corridor. All other areas are at least 1 mile away from either the proposed or alternate route.
- *Raptor Nesting Areas* - The slopes of the Toiyabe and Toquima ranges, particularly the Toiyabe, contain many areas with rock outcrops and aspen stands and are considered to provide some of the best raptor habitat in Nevada (Herron, personal communication 1979). Rock outcrops in the Toiyabe Range provide nesting habitat for several pairs of golden eagles and prairie falcons. Aspen stands support numerous goshawks, Cooper's hawks, and sharp-shinned hawks. The area designated for ferruginous hawks (Map 2-3) includes the transitional zone between the open shrub and the pinyon-juniper type along the south end of the Toquimas. A known nest site occurs in this area. Intensive search of the mine/mill complex and a 1-mile perimeter revealed no raptor or owl nests, although burrowing owls were sighted on the property and may nest in areas to be disturbed. The NDW records no raptor nests in the vicinity of the mine/mill complex (Herron, personal communication 1979).
- *Fish Habitat* - Aquatic habitat is extremely limited in the Big Smoky Valley. Seven streams in the Big Smoky Valley have habitat for fishes and contain a variety of introduced trout species. Of the seven only two have fish habitat below the crossing of the proposed or alternate transmission line: Kingston and Bowman Creeks on the west side of the valley. Habitat in the others deteriorates above the crossings as the streams become intermittent or ephemeral in the valley floor (U.S.D.I., BLM no date, b).
  In addition to the streams, Darroughs Ponds contain bluegill and a number of other unmapped ponds contain introduced species. One spring on the west side of the valley contains two fishes which are candidates for listing as threatened and endangered species. The location of the spring is not mapped because it is thought to be the only place in the Big Smoky Valley where the Big Smoky Valley speckled dace and the Tui chub still survive (Lugaski, personal communication 1980). The spring is located more than 2 miles from the proposed transmission line route.
- *Aquatic and Riparian Areas* - These areas include the few streams and springs of the region as well as stock ponds and reservoirs developed on private land. Their importance stems from the limited occurrence in the region of the riparian vegetation type and their use as a water source for many animals. Aquatic and riparian areas are the only habitat areas for fishes and other aquatic species. In central Nevada, these areas, together with seasonally wet playa areas, also serve as important resting stops for waterfowl (geese and dabbling ducks, primarily) and shore birds on their fall and spring migrations.
- *Rock Outcrops and Cliffs* - As stated under raptor nest sites, these areas, found on the steep slopes of the mountain ranges, are important as nesting areas for golden eagles, prairie falcons, and other raptorial birds. The majority of the rock outcrops occur in the mountain ranges, well away from the area potentially affected by the transmission line routes or mine/mill. One occurs in the San Antonio Mountains, east of the mine/mill site.
- *Meadows* - Grassy meadows or pastureland, either in valleys or upland areas, natural or developed by man, are important because of their relative scarcity in the region. They can be especially important as brooding areas (upland meadows) or strutting grounds for sage grouse.

In addition to the significant species mentioned in the above discussions, several other wildlife species are defined as significant based on their status as a threatened or en-



Map 2-3 Important Areas of Wildlife Habitat

dangered species or as a candidate for such listing. The species provided by FWS and a summary of their status in the project area are presented in Table 2-7. Only the bald eagle is currently listed and afforded legal protection; the remaining species are undergoing review and could be listed sometime in the future as a result of the review process. The BLM manages the candidate species on public lands as if they were officially on the list of threatened and endangered species.

CULTURAL RESOURCES

Information on the cultural resources potentially affected by the Proposed Action and alternatives was obtained through literature review and field surveys of the mine/mill complex, pro-

TABLE 2-7

SUMMARY OF STATUS OF LISTED AND CANDIDATE THREATENED AND ENDANGERED FISH AND WILDLIFE IN THE VICINITY OF THE NEVADA MOLY PROJECT

Species[1]	Summary of Status in Affected Area
Bald eagle	Six bald eagle sightings are on record in BLM files for the entire Battle Mountain District[2]. Herron[3] believes eagles may occasionally pass through the project area during winter. Turner[7] reports three bald eagle sightings in the Big Smoky Valley.
Big Smoky Valley speckled dace	Endemic fish known only from one spring on the west side of the Big Smoky Valley[4]. Spring is located more than 2 miles from proposed transmission line.
Tui chub	Endemic fish once known from east side of Big Smoky Valley. Now known only from spring on west side mentioned above[4].
Desert tortoise	One sighting in BLM Battle Mountain District, southeast of Tonopah, believed to have been a pet[3]. Herron believes northernmost extent of tortoise range is more than 50 miles south of Tonopah.
Gila monster	Not known from project area. Herron[3] states that range does not extend as far north as project area.
White-faced ibis	May migrate over study area. Several important nesting areas occur in Nevada, but none in Big Smoky Valley or vicinity[3].
Swainson's hawk	Three sightings on record in BLM Battle Mountain District[2]. Two sightings on record in Nevada DOW files for Big Smoky Valley. One sighted between Tonopah and mine/mill site in July 1978[6]. Not known to nest in Big Smoky Valley[3].
Ferruginous hawk	Two known nests in vicinity of Big Smoky Valley[5]. Additional nest sites may occur as Big Smoky Valley is within major ferruginous hawk range in Nevada. Prefers nest sites in pinyon-juniper at edge of broad open valleys[3].

[1]Species list provided by U.S. Fish and Wildlife Service Office of Endangered Species, Portland, Oregon. January 1980. The bald eagle is the only species officially listed as endangered. The other species are not afforded legal protection at present time. These species are candidates for the threatened and endangered species list and may in the future receive legal protection.

[2]Sykes, D. February 1980. District Wildlife Biologist, BLM Battle Mountain District. Personal communication.

[3]Herron, G. December 1979 and February 1980. Nongame Wildlife Coordinator, Nevada Department of Wildlife, Reno. Personal communications.

[4]Lugaski, T. February 1980. PhD. candidate, Desert Research Institute, University of Nevada, Reno. Personal communication.

[5]Mason, D. February 1980. Wildlife Biologist, BLM Tonopah Resource Area. Personal communication.

[6]ERT Wildlife Technical Report 1980.

[7]Turner, B. March 1980. Nongame Biologist, Nevada Department of Wildlife, Las Vegas. Personal communication.

Source: ERT EIS Team.

posed transmission line route, and West Smoky Valley alternative transmission line route. An intensive survey (Class III) was completed on the entire proposed transmission line route. The alternative transmission line route was surveyed by a reconnaissance level survey (Class II) required by BLM. Because the transmission line could be located on either side of Highway 376 in this alternative, sampling was conducted within a 500-foot corridor on either side of the highway. Detailed methods and results of the cultural resources survey are contained in the ERT Cultural Resources Technical Report (1980).

Prehistoric Sites

Twenty-three small single activity prehistoric sites were identified on the mine/mill area through an intensive field survey by the Nevada State Museum. Their value for local prehistory exists in the materials they contain, and since the total amount of surface materials did not exceed 20 artifacts at any individual site, an intensive collection was undertaken, with all material collected and curated by the Nevada State Museum. Additional information on the sites identified at the mine/mill site can be found in the ERT Cultural Resources Technical Report (1980).

A total of ten small sites were located on the proposed powerline route (Table 2-8). Six of the sites consist of a single artifact and therefore indicate that a single task was likely performed at each location. The four remaining small sites consist of at least a single tool and a scatter of flakes or other lithic debris. These sites represent activities of more extended duration but are also a transient activity location.

Nineteen prehistoric archeological sites identified along the West Smoky Valley Alternative powerline corridor are small, single task locations (Table 2-9). At least three other sites indicating extensive occupation are found near the West Smoky Valley Alternative corridor along Highway 376 (26Ny563, 26Ny2031 and 26La932). The first two sites are within 3 miles of one another and occur on both sides of Highway 376. On either side of the highway, the transmission line would bisect these sites. The third is adjacent to the eastern corridor (just outside the corridor) along Highway 376.

Historic Sites

No properties presently located on the Na-

TABLE 2-8

CULTURAL RESOURCES WITHIN THE PROPOSED POWERLINE CORRIDOR

Prehistoric Site Number	Site Type	Size	Elevation	Distance from Water	Other Significant Association
26Ny2014	Task Site	one artifact	6020 ft.	2.5 mi to spring	
2016	Task Site	small	5840 ft.	4 mi to mtn streams	
2017	Task Site	one artifact	5920 ft.	660 ft. to Barker Cr.	
2018	Task Site	one artifact	5920 ft.	immediate-Barker Cr.	
2019	Task Site	one artifact	6080 ft.	3.5 mi to spring	
2033	Task Site	one artifact	6000 ft.	2.5 mi to spring	
26La1168	Task Site	small	5581 ft.	3 mi to spring	Possible playa association
1169	Task Site	one artifact	5630 ft.	2.75 mi-Spencer Hot Spring;	Possible playa association
1170	Task Site	small	5850 ft.	3 mi to spring	
1171	Task Site	small	6000 ft.	2 mi to spring	
Historic					
26Ny2015	Dump	small	5980 ft.	1.75 mi to spring	Round Mountain mining area (1905)

Source: ERT EIS Team.

TABLE 2-9

CULTURAL RESOURCES WITHIN THE ALTERNATE POWERLINE CORRIDOR

Prehistoric Site Number	Site Type	Size	Elevation	Distance from Water	Other Significant Associations
26La1188	task site	very small	5768 ft.	1.24 miles	
La 933	task site	very small	5640 ft.	on site	near wetlands
La1189	task site	very small	5660 ft.	65.6 feet	
La 932	settlement	large	5660 ft.	on site	near wetlands
La1190	task site	very small	5665 ft.	65.6 feet	
La1191	task site	very small	5760 ft.	1.24 miles	
La1192	task site	very small	5760 ft.	---	
La1193	task site	very small	5850 ft.	---	
Ny2020	task site	very small	5525 ft.	---	
Ny2021	task site	very small	5600 ft.	0.62 miles	
Ny2022	task site	very small	5600 ft.	0.93 miles	
Ny2023	camp/task	small	5520 ft.	0.31 miles	
Ny2024	task site	very small	5530 ft.	on site	
Ny2025	task site	very small	5580 ft.	656 feet	
Ny2026	task site	very small	5600 ft.	984 feet	
Ny2027	task site	very small	5580 ft.	---	
Ny2028	task site	very small	5580 ft.	---	
Ny2029	task site	very small	5670 ft.	0.93 miles	
Ny2030	task site	very small	5700 ft.	0.62 miles	
Ny2031	settlement	large	5640-80 ft.	on and near site	less than 1.2 mi. from other springs
Ny2032	task site	very small	5720 ft.	.5 miles	
Ny 563[1]	settlement	large	5640-5720 ft.	on and near site	less than 1.2 mi. from other springs

[1]Recorded by previous survey.
Source: ERT EIS Team.

tional Register of Historic Places are situated within the mine/mill area. However, the Blue Jack and Liberty Mines are of regional significance and are located in the immediate vicinity of the mine/mill area.

- The principal features of the Blue Jack Mine are three stone wall structures located at the confluence of two canyons and approximately 2,000 feet southeast of a mine shaft. The remaining stone walls are of locally available talus stone that was fractured into sizes suitable for dry wall construction. Scattered around these structures are glass and pottery debris of previous site occupants.
- "La Libertad" or Liberty Mine was historically the earliest and most important silver mine in the Tonopah region until the "Tonopah Boom." The Liberty Mine is located on private land, not part of Anaconda's mining claims, and is listed on the Historic Site Inventory for the Bureau of Land Management Tonopah Resource Area. Today, only the foundations of the prior structures associated with the mining activities remain. A few stone walls from the earliest operations are still present. Most evident, however, are the cement foundations of buildings constructed during the 1909-1910 operation. The only intact structure is a stone-walled, cement-lined cistern. The remains of a small kiln, probably for assaying ores, also stand.

The principal category of historic resources associated with the proposed transmission line corridor are numerous historic trails or roads dating from the time of the valley's earliest Anglo settlement more than 100 years ago. A listing of the roads intersecting the powerline corridors is provided in Table 2-10. Many of the earliest transportation routes across the valley continue in use today and are indicated on U.S. Geological Survey maps as improved or un-

TABLE 2-10

HISTORIC ROADS INTERSECTING PROPOSED AND ALTERNATE CORRIDORS

Route Name/Destination	Location Section/Township/Range	Recorded on USGS o=no x=yes
Proposed Route		
San Antonio Mines	5/ 6/42	O[1]
Unnamed Road (San Antonio Ranch-east over mountains)	22/ 7/42	X
Wadsworth and Belmont Rd.	12/ 7/42	X
"Old Road"	12/ 7/42	O
Unnamed Road	20/ 8/43	X
Unnamed Road (Belmont to Manhattan)	9/ 8/43	O
Unnamed Road	14/ 9/43	X
Unnamed Road	1/10/43	X
Unnamed Road	17/11/43	O
Unnamed Road	8/11/44 33/12/44	O
Moore's Creek Ranch Road (1873/1907)	22/12/44	X
Road to Belmont (1907)	11/12/44	X
Austin-Belmont Road	(35)/13/45	X
Northumberland	(6)/13/45	X
Northumberland	31/14/45	X
Old Road	31/14/45	O
Unnamed (to Wildcat Canyon, North Fork and Jeans Springs)	17/14/45	O
Unnamed (to Spring)	16/15/45	X
Unnamed	27/16/45	O
Unnamed (to Clipper Gap)	10/16/45	O
Unnamed (to Hot Springs)	3/17/45	O
Overland Stage Route	12/18/45	X
Pony Express Route	(23)/19/45	X
Alternate Route		
Austin-Belmont Main Road	(24)/12/43	O
Branch, Austin-Belmont	25/13/43	O
Alternative Auton Road	NS/ /43	X
Auton-Belmont	18/15/43	O
Auton-Belmont	5/15/43	
Unnamed (Road to Eureka)	20/17/44	O

[1]The locations of roads not identified on the USGS 7.5 and 15 minute series maps are derived from the 1873 cadastral survey plat sheets of the region which are available at the Reno BLM office.

Source: ERT EIS Team.

improved (two-track) roads. The list of intersecting routes in Table 2-10 also includes those roads which may exist but whose presence requires further confirmation. In a few instances field survey of the corridors disclosed older abandoned roads running parallel to presently used routes; two cases occur on the proposed route: old road to Northumberland and an unnamed road to a spring below Clipper Gap canyon.

Only one historic site was located within the proposed powerline corridor. It is located west of Round Mountain and contains refuse probably associated with early 20th century mining.

The principal historic feature of the alternate route is the Austin-Belmont Stage Road which intersects the corridor at several locations (Table 2-10). For most of the corridor's length, the stage road lies east of the 500-foot bound-

ary. At the Minnium's Stage station it probably is within the corridor until crossing to the west of Highway 376 near the Lander County border. Within close proximity to the Belmont-Austin Road are numerous historic structures related to the original Anglo settlement of the valley.

Only one historic site was identified within the alternate powerline corridor. The Minnium Stage Station, established by the Minnium family who settled in the area prior to 1873, contains ruins that are directly adjacent to the corridor's eastern boundary along Highway 376.

VISUAL RESOURCES

The BLM has implemented a visual inventory and analysis process to provide for a systematic inter-disciplinary approach in the management of aesthetic values on public lands. The Visual Resource Management (VRM) system inventories existing scenic quality and assigns visual management categories based on a combination of scenic values, visual sensitivity, and viewing distance zone. Five VRM classes have been established to provide guidance in ascertaining the degree of modification acceptable to the landscape affected by proposed management activities (Table 2-11).

Four VRM classes (II, III, IV, and V) exist in the study area and are shown on Map 2-4. The mine/mill complex and the majority of the length of the proposed 230kv transmission line would be located in VRM Class IV areas. Alternative 1, the West Smoky Valley alternate location for the transmission line corridor, presents two options for placement of the transmission line: (1) the west side of Highway 376, and (2) the east side of Highway 376. On either side of the highway, the transmission line would be located primarily in Class III and IV areas.

Fourteen BLM Scenery Quality Rating Units were identified by the BLM Battle Mountain District for the study area. These units correspond to portions of the landscape that display similar visual characteristics. Figure 2-1 shows photographically the visual characteristics of the project area.

Values (A, B or C) were assigned to each unit based upon the scenic quality of the unit in relation to other units in the area. The Toiyabe Mountains west of Highway 376 and the Mount Jefferson area of the Toquima Range east of Round Mountain were designated as outstanding scenery (Class A). The alluvial area east and south of the Toiyabe range, the northern Toiyabe range, the alkali flat adjacent Highway 376, the Simpson Park Mountains, the San Antonio Mountains, the Crescent Sand Dunes and the north and south Toquima Range were designated as moderately high quality scenery (Class B). The remaining Big Smoky Valley floor was designated the lowest relative quality scenery (Class C). For a detailed technical discussion of visual resources in the areas

TABLE 2-11

VISUAL RESOURCE MANAGEMENT CLASSES

Class I	- This class primarily provides for natural ecological changes only. It is applied to primitive areas, some natural areas, and other similar situations where management activities are to be restricted.
Class II	- Changes in any of the basic elements (form, line, color, or texture) caused by a management activity should not be evident in the characteristic landscape.
Class III	- Changes in the basic elements (form, line, color, texture) caused by a management activity may be evident in the characteristic landscape. However, the changes should remain subordinate to the visual strength of the existing character.
Class IV	- Changes may subordinate the original composition and character but must reflect what could be a natural occurrence within the characteristic landscape.
Class V	- Change is needed. This class applies to areas where the naturalistic character has been disturbed to a point where rehabilitation is needed to bring it back into character with the surrounding countryside. This class would apply to areas identified in the scenery evaluation where the quality class has been reduced because of unacceptable intrusions. It should be considered an interim short-term classification until one of the other objectives can be reached through rehabilitation or enhancement. The desired visual quality objective should be identified.

Source: BLM Manual 8411.

The Toiyabe Range

The Toiyabe Range with Snow

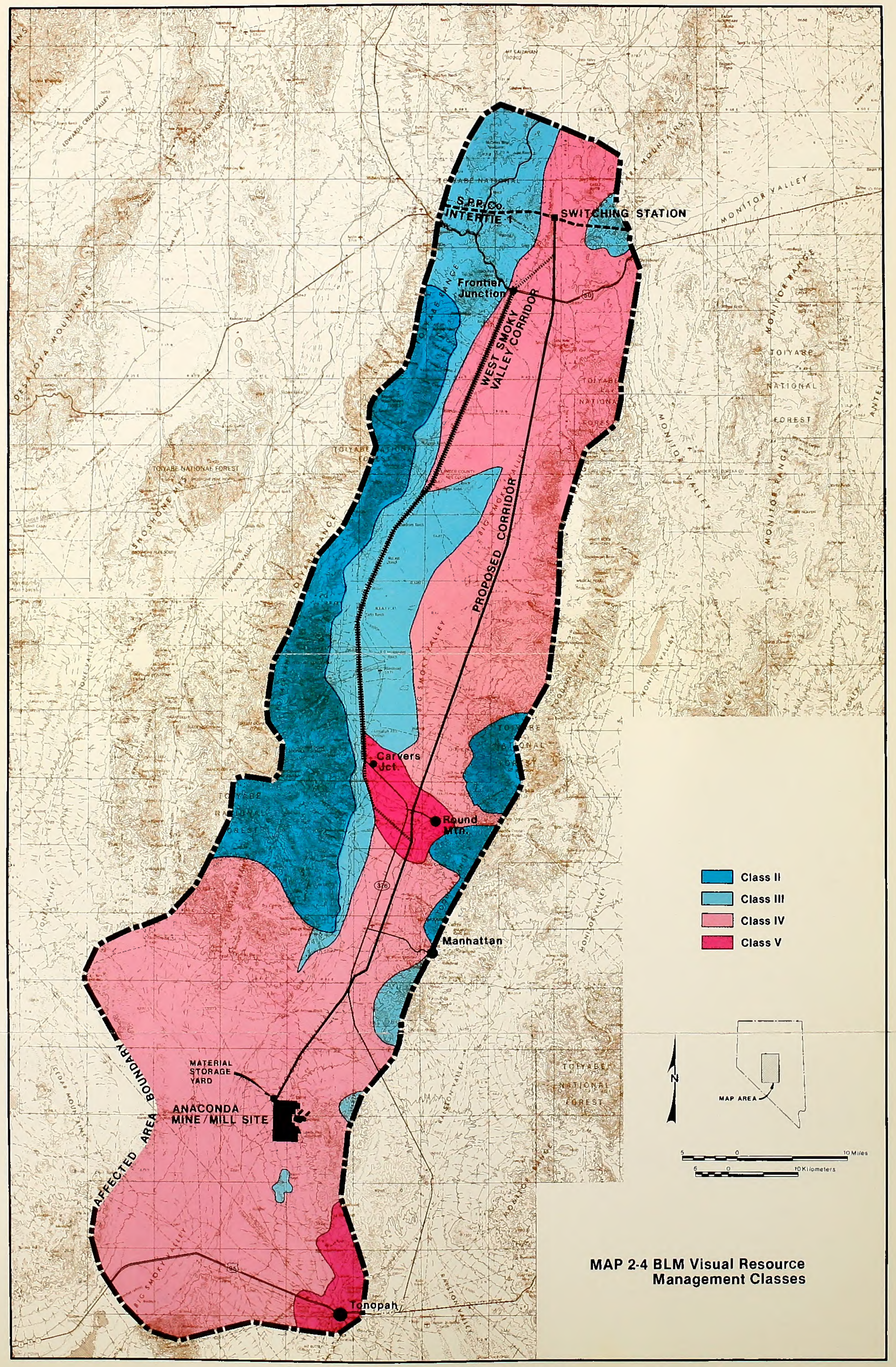
The Arc Dome Area of the Toiyabe Range

The Lower Big Smoky Valley

The Mine/Mill Site

The Upper Big Smoky Valley

Figure 2-1. Photographs of Scenery in the Project Area



MAP 2-4 BLM Visual Resource Management Classes

potentially affected by the Nevada Moly Project, refer to the ERT Visual Resources Technical Report (1980).

WILDERNESS VALUES

The BLM has completed its initial inventory of lands in Nevada and concluded that most of its lands in the Big Smoky Valley and near Tonopah are not suitable for wilderness designations. Two parcels, the San Antonio and Hickison study units, were found to meet the requirements for intensive study, i.e., they were not immediately eliminated from consideration because they failed to meet the established criteria.

Both units were subjected to accelerated intensive review at the request of interested parties. As a result of the intensive reviews both units were found to lack outstanding opportunities for solitude or a primitive and unconfined type of recreation. Portions of each unit were found to be in an unnatural condition and were therefore dropped from further wilderness consideration.

NOISE

The proposed project elements are located in a sparsely populated, semiarid region in the central portion of Nevada. The mine/mill complex is located approximately 18 miles northwest of Tonopah. There are no residences within an approximate 10-mile radius of the mine/mill complex. The proposed transmission line would be located entirely on public lands and with the nearest residence located at a distance of over 1 mile from the right-of-way. The alternative transmission line corridor would be located on private and public lands with some residences within a mile of the right-of-way. Noise sensitive wildlife species are limited primarily to raptors which nest in surrounding mountain ranges and use the valley areas as hunting grounds. A more detailed identification of wildlife species is contained in the ERT Wildlife Technical Report (1980).

The only sources of manmade noise now affecting the project area are (1) exploratory drilling operations, (2) occasional off-road vehicles, and (3) occasional light aircraft and military overflights. The project site and surrounding area do not presently contain significant sources of manmade noise. Natural sources of noise consist principally of wind blowing through grass and brush.

Due to the remoteness of the project area from manmade sources of noise and the existence of measured data for similar remote areas, it was determined that a field measurement program to measure existing noise was not necessary. The U.S. Environmental Protection Agency (1971a) has data that show that in natural environments noise levels can be extremely low, on the order of 15 decibels, A-weighted (dBA) and vary over a considerable range up to levels of approximately 45 dBA, depending upon what sources are present. It is assumed that the project area's baseline noise levels range from 15 dBA to 45 dBA.

RECREATION

The primary study area for recreation resources is Nye County. Recreational resources in Nye County center around public lands. There are over 1.7 million acres of national forest and 6.7 million acres of BLM-administered land in Nye County (U.S.D.I., Bureau of Land Management 1976). Additional recreation opportunities are also afforded by the Federal lands in the areas surrounding Nye County, e.g., the Toiyabe National Forest in Lander County. Individual, dispersed forms of recreation, such as off-road vehicle (ORV) use, backpacking, and camping are the primary activities on national lands. In addition, these lands also support bird, fish, and game populations, particularly deer, that provide the opportunity for hunting and fishing. Limited improved campsites are available.

In recent years, participation in recreation on the national resource lands in the Tonopah area has been increasing, especially in hunting and ORV use. Even though there is a vast amount of land, most of which is managed for dispersed recreation, the increased participation has resulted in some problems, e.g., a demand for more improved campsites. As of yet, these problems are not considered serious. However, the opportunities provided in the area are limited and have a restricted capacity to adsorb additional use (Michely, personal communication 1980).

Naturally occurring geographic formations and prehistoric remains also offer scenic recreational opportunities for residents and tourists. These include the natural arch near Currant, the Lunar Crater Volcanic Field, and the Ichthyosaur State Park (Smith 1970).

Ghost towns and other historic sites reminiscent of the old mining and western lifestyle are also plentiful in Nye County. Among the more well-known areas are Tonopah, Manhattan, Belmont, and Berlin (Smith 1970). These sites are shown in Map 2-5. Other historic attractions in nearby areas are within easy driving distance of Tonopah.

Most of the community recreational facilities in Tonopah are located at the two town parks

and the schools. Servicemen's Memorial Park has an outdoor swimming pool, two tennis courts, and a picnic area. Tonopah Memorial Park is an older park with horseshoe areas, a playground, and picnic tables. The Tonopah High School athletic field is used for football, track, and summer softball leagues. The school also has a gymnasium and auditorium which are used for indoor activities. Other facilities include a tennis court at the old Air Force camp on the south end of Tonopah, and a target-shooting range south of town. There are several organized youth and adult leagues active in Tonopah for public participation in softball, baseball, and volleyball (Logan, personal communication 1979). Participation by Nye County residents in boating, golf, or skiing requires travel to other areas outside the county.

The Juvenile Probation Department offers recreational opportunities for the youth of Nye County. Its programs include organizing outings for boating and camping, showing recently released motion pictures throughout the county, and organizing sporting events. The program supervisor reports that the activities have had excellent response (Gilman, personal communication 1979).

Residents generally feel that recreation opportunities in Tonopah are very limited. There is much interest and participation in the organized activities, for example, the softball league. However, the various organized activities and those of the school must compete for limited facilities. The result is that participation in such activities is sometimes restricted, scheduling is difficult, and the recreation demands of the community are unsatisfied. Residents would also like to see additional private recreation opportunities, such as a theater, a bowling alley, and a sports-health-racquetball club (Logan, personal communication 1979; Joseph, personal communication 1980).

The baseline growth in population would result in increased participation in individual, dispersed forms of activities, increased pressures on wildlife, and increased demands for local or community recreation programs and facilities. Staff members of the Federal agencies responsible for managing the national resource lands indicate that while such increases may result in some decline in the recreation experience, e.g., overcrowding of campsites, the dispersed form of recreation would continue to dominate and the additional demands can be absorbed (Michely and Joseph, personal communications 1980). An indirect effect of increased crowding on local resources would be minor increased usage of recreation resources slightly further away, such as the Toiyabe National Forest in Lander County.

Nye County has acquired 110 acres of land in the Tonopah area from the BLM, 40 acres of which are planned for additional recreation facilities, such as baseball and softball fields (Rowley and Hamilton, personal communications 1980). When completed, these facilities will allow for expansion of current programs to meet demands of existing and future baseline populations. There are no known plans to develop private commercial recreation facilities in the study area.

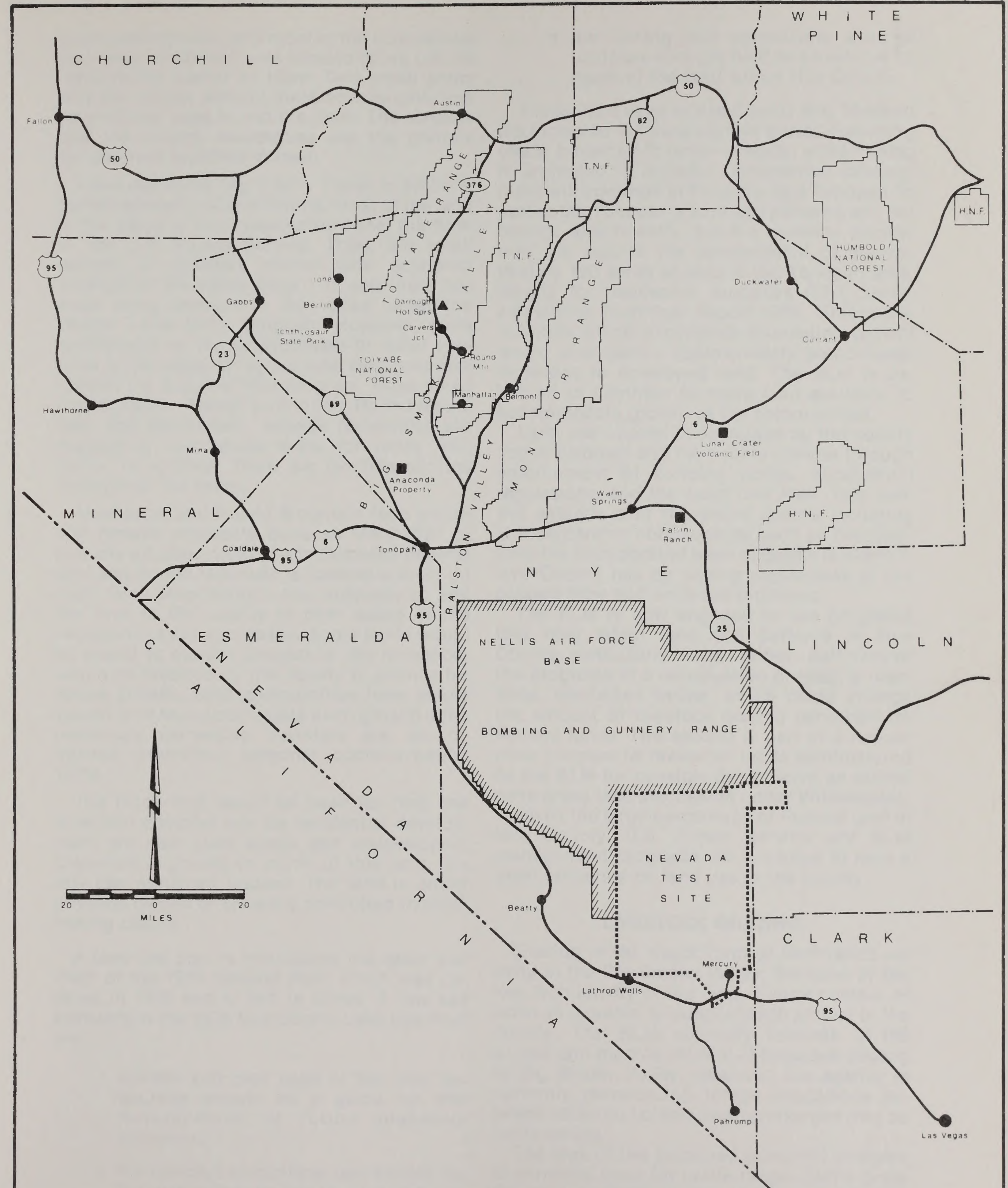
LAND USE AND LAND USE CONTROLS

Land use and ownership in Nye County were inventoried in 1970 with minor updating in 1978. Since that time, land use has remained essentially unchanged. The county encompasses 11,561,000 acres, or 18,064 square miles (Smith 1970). Of this, 94.5 percent, or approximately 10,933,440 acres, is administered by the Federal government and is contained in BLM lands, two U.S. forest reserves, and two test sites controlled by the U.S. Department of Energy. Less than 0.1 percent of the county is state owned, leaving approximately 5.4 percent, or 627,000 acres in private ownership.

Predominant land uses in Nye County are forest lands in national forests, government withdrawals (Indian colonies and the test sites), mining, agricultural lands, range and grazing lands, and small rural communities. Grazing lands are discussed in a subsequent section.

The communities in Nye County include Beatty, Gabbs, Manhattan, Round Mountain, Mercury, and Tonopah. They are primarily residential areas, although there is some commercial usage in each. Of the major townships, Tonopah, Beatty, and Gabbs are principal population centers; however, the Pahrump Valley, in the southern part of the county, has experienced considerable population growth since 1970, and is becoming the largest population center in the county.

Growth and development of land in and around Tonopah is limited by two important factors. First, the town is surrounded by Federal lands, administered primarily by BLM. However, the BLM has agreed to sell several parcels within the town boundaries to Nye County which would increase the amount of land available for development. One such sale (110 acres) was recently completed. Second, the town is located on patented mining claims, which makes the consolidation of sufficient amounts of land for economically feasible development extremely difficult. Within the town, residential



MAP 2-5 Socioeconomic Study Area Map

uses predominate, with most of the commercial and retail establishments located along U.S. 95 through the center of town. Two small parks and the school athletic field are the principal recreational uses within the town. The schools and the county courthouse are the primary government facilities in town.

Land use in the Big Smoky Valley is predominately agricultural and mining. Most of the land in the valley is administered by either the BLM or the U.S. Forest Service. There are small parcels of privately owned land scattered throughout the valley (Map 1-1), and there has been some interest in the valley under the Desert Land Entry program. However, state restrictions on the development of water supplies in the valley for agricultural purposes may restrict the scope of that program. Three small communities - Carver's Junction, Round Mountain, and Manhattan - provide residential and supporting commercial areas for valley residents. In addition, there are ranches spotted throughout the valley.

Manhattan and Round Mountain face uncertain growth prospects because Manhattan is partially situated on BLM-administered Federal land and Round Mountain is located entirely on such land. Negotiations are underway to sell the land to the county in both cases. If the negotiations are successful, some lands would be resold to current occupants; the remainder would be retained by the county to provide for future growth. Both communities have ample vacant land to accommodate such growth if the necessary ownership transfers are accomplished (Hamilton, personal communication 1979).

The lands that would be used for both the mine/mill complex and for residential development are now open space and undeveloped. Livestock is grazed on some of this land; the rest has remained unused. The land is either privately owned or privately controlled through mining claims.

A land use plan is considered the basic element of the 1970 *General Plan,* which was updated in 1978 and is still in effect. A few key elements in the 1978 Nye County Land Use Plan are:

- current and past uses of the land resources should be a guide for the development of future planning elements,
- the concept of multiple use should be the overriding policy in planning for Federally controlled lands, and
- the mining and agricultural uses of lands are strongly held as a best use for much of the land within Nye County.

Future land uses in Nye County and Tonopah are expected to follow current trends. Ranching use is projected to remain steady, while mining is projected to increase. Residential development will continue in Pahrump and Tonopah. In particular, Tonopah's land use patterns will not change significantly, but the baseline population will require the development of approximately 120 acres of land in the Tonopah area, mostly for residential purposes (ERT Socioeconomics Technical Report 1980). Other communities which experience population growth would also realize approximately proportional increases in developed land. The BLM is expected to continue to make land available to accommodate growth of the communities.

Land use control is exercised by the county commissioners and the county planner through enforcement of building codes, subdivision regulations, and the *Land Use Plan*. This control extends over the entire county including unincorporated communities such as Tonopah. Only the incorporated town of Gabbs is exempt. Nye County has no zoning regulations at the present time and none are proposed.

The BLM is now engaged in two programs that may affect land use patterns in Nye County, particularly in the northern half. One of the programs is a reevaluation of grazing practices, discussed below, which could change the amount of livestock grazing permitted on Federal lands. The second is part of a nationwide program to review all lands administered by the BLM for possible designation as wilderness areas (see discussion under Wilderness).

Given the large percentage of Federal land in Nye County, U.S. Forest Service and BLM management programs will continue to have a great influence on land use in the county.

LIVESTOCK GRAZING

Grazing is the major form of farm/ranch activity in the Big Smoky Valley. Because of the low productivity of the land, a large number of acres is required to support each animal in the county. The BLM currently licenses 31,156 animal unit months (AUMs) of livestock grazing in Big Smoky Valley. However, the agency is currently reevaluating forage allocations between cattle and other uses, so changes may be forthcoming.

The area of the proposed mine/mill complex is currently used for cattle range. Cattle graze the area primarily in the spring and fall. The project area is adjacent to the BLM San Antone

allotment, which has carrying capacities as follows:

- Public acreage 440,826 acres
- Available vegetation 11,482
- Five-year livestock use 10,515
- Existing mule deer use 494

Carrying capacity is low (approximately 38 acres/AUM) because of the sparse vegetative cover and infrequent rainfall.

The Big Smoky Valley is largely open range, utilized for grazing purposes for sheep and cattle. The average stocking rate for the allotments in the valley is 27 acres per AUM, somewhat more productive, on average, than the area of the proposed mine/mill complex (ERT Vegetation Technical Report 1980).

MINERAL RESOURCES

Mining is one of the most important economic activities in Nye County, employing the third largest number of workers of any major economic sector.

In the Big Smoky Valley area, a number of economically important minerals are found in the surrounding mountains. Minerals found in quantities sufficient for economic recovery include: gold, silver, copper, antimony, lead, zinc, mercury, molybdenum, tungsten, and uranium (Baker, et al. 1972). Sand and gravel are also present in large quantities throughout the valley. Mining activity is presently underway near both Round Mountain and Manhattan with gold being the principal product recovered.

TRANSPORTATION

The transportation system in Nye County is influenced by the large land area of the county, geographic and land use constraints (e.g., the Nevada Test Site), low population densities, and the remoteness of many communities from any major towns and cities. This had led to a heavy reliance on surface transportation, particularly an expansive highway network. The network consists of nearly 3,000 miles of Federal, state, and county roads and highways, about one-third of which are paved (Gill, personal communication 1979; Boni, personal communication 1979).

The major highways in Nye County are U.S. 95 and U.S. 6. U.S. 95 serves as the primary link between Tonopah and Las Vegas to the south and Reno to the north. U.S. 6 is a major east-west highway providing access to the eastern portions of Nye County, Ely, and Salt Lake City, and westerly access to California. These two highways intersect in Tonopah, making the town a focal point of travel in and through Nye County and enhancing its position as a trade and service center.

Important state highways linking Tonopah with the remainder of Nye County and the state are State Highways 376 (formerly 8A), 89, and 81. All of these are paved except Highway 89 which is paved for 3 miles north of Tonopah and graveled for the rest of its length. Of particular importance are Highways 376 and 89. Highway 376 intersects U.S. 6 six miles east of Tonopah and runs generally north through the Big Smoky Valley, while Highway 89 runs northwest from U.S. 95-6 near Tonopah and provides access to the proposed mine/mill site.

Average daily traffic data for 1978 indicate that current traffic volumes on the roads range from a low of five vehicles per day on State Highway 89 to a high of 1,700 vehicles per day on the combined U.S. 95 and 6, immediately northwest of Tonopah (Nevada State Department of Highways 1977). With the exception of Highway 89, which cannot be evaluated because it is unpaved, all roads in the study area currently provide at least "C" level service—defined as providing relatively free-flowing traffic averaging approximately 50 miles per hour (Table 2-12). No roads in the study area presently have capacity problems (Gill, personal communication 1979; ERT Socioeconomic Technical Report 1980).

The maintenance of the highway network is the responsibility of the Nevada State Highway Department and the Nye County Roads Department. Lack of sufficient equipment, shortages of skilled labor, relatively low wages, and tight budgets were identified as problems in both departments (Gill, personal communication 1979; Boni, personal communication 1979).

Other transportation services include a privately owned busline, the Las Vegas-Tonopah-Reno Stageline, offering twice daily service between Reno and Las Vegas through Tonopah. Although railroads were once an important part of the transportation system in Nye County, the nearest railhead is now at Mina, Nevada, 70 miles northwest of Tonopah.

There are numerous small airports in Nye County. The largest of these, Tonopah Airport, is 8 miles east of the town of Tonopah. It has two paved runways (the longest is 8,900 feet long), a fixed-based operator providing charter flying services, and a Federal Aviation Administration Flight Service Station. An improvement program is underway to reinforce runways and taxiways and to add runway lighting (Peterson, personal communication 1979). There is no scheduled passenger air service in Nye County.

The town of Tonopah is bisected by combined U.S. Highway 95 and 6, providing four

TABLE 2-12

PRESENT AND FUTURE TRAFFIC VOLUMES AND HIGHWAY CAPACITIES NEAR TONOPAH

	U.S. 95 & 6 Northwest of Tonopah	U.S. 95 & 6 at Bryan Ave. in Tonopah	U.S. 95 South of Tonopah	U.S. 6 East of Tonopah	S.R. 89 North of Tonopah	S.R. 376 North of Airport
Average Annual Daily Traffic						
• 1979	1,735	7,960	1,340	840	5	300
• 2001	2,515	11,310	1,905	1,195	7	430
Peak Hour Traffic Volume						
• 1979	347[1]	876[2]	268[1]	168[1]	1[1]	60[1]
• 2001	503	1,244	381	239	2	86
Hourly Capacity[3]	956	2,000	956	956	N.D.	624
Volume/Capacity Ratio[5]						
• 1979	.36	.44	.28	.18	[4]	.10
• 2001	.53	.62	.40	.25	[4]	.14

N.D. = Not defined for graveled roads.
[1]Assumed to be 20% of annual average daily traffic.
[2]Assumed to be 11% of annual average daily traffic.
[3]No improvements would occur during the baseline period.
[4]Although undefined, the utilization rate would be extremely low.
[5]Volume/capacity ratio illustrates the relationship between the highway's current use and ultimate capacity. A ratio of 1.0 would indicate the highway is utilized to capacity.
Source: ERT Socioeconomic Technical Report 1980.

traffic lanes, with the local street system branching out on both sides of the highway. Many of the local streets are paved though few have curbs and gutters. In 1978, the annual average daily traffic reported on Highway 95-6 in town was 7,800. Flow through town does not create significant problems, but there is limited parking in the center of town, creating some problems (ERT Socioeconomic Technical Report 1980).

The projected baseline growth of Tonopah and Nye County will have little effect on the local transportation network. Beyond minor congestion and parking problems associated with additional vehicular traffic in Tonopah, the most probable effects would in fact be beneficial. A higher population base, coupled with the completion of the airport improvement program could lead to a return of commuter air service for Tonopah; while the expanded population could also lead to improved intercity bus service for Tonopah. Highways around Tonopah would still have excess capacity and would continue to provide at least "C" level service as shown in Table 2-12.

SOCIOECONOMICS

Population

The population of Nye County declined from 6,504 in 1920 to 3,101 in 1950; since 1950 it has increased steadily to 5,599 in 1970 (U.S. Department of Commerce, Bureau of the Census 1970) and 7,994 persons in 1979, a 42.8 percent increase from 1970 to 1979 (U.S. Department of Commerce, Bureau of the Census 1979). Most of the population growth in the county has occurred in the Pahrump Valley and Beatty areas. Although the population of the town of Tonopah has also increased consistently since 1950, it has not grown as rapidly as that of the county. Tonopah's share of the county population decreased from 44.3 percent in 1950 to approximately 26.3 percent in 1979. These population trends are illustrated in Figure 2-2 and in Table 2-13.

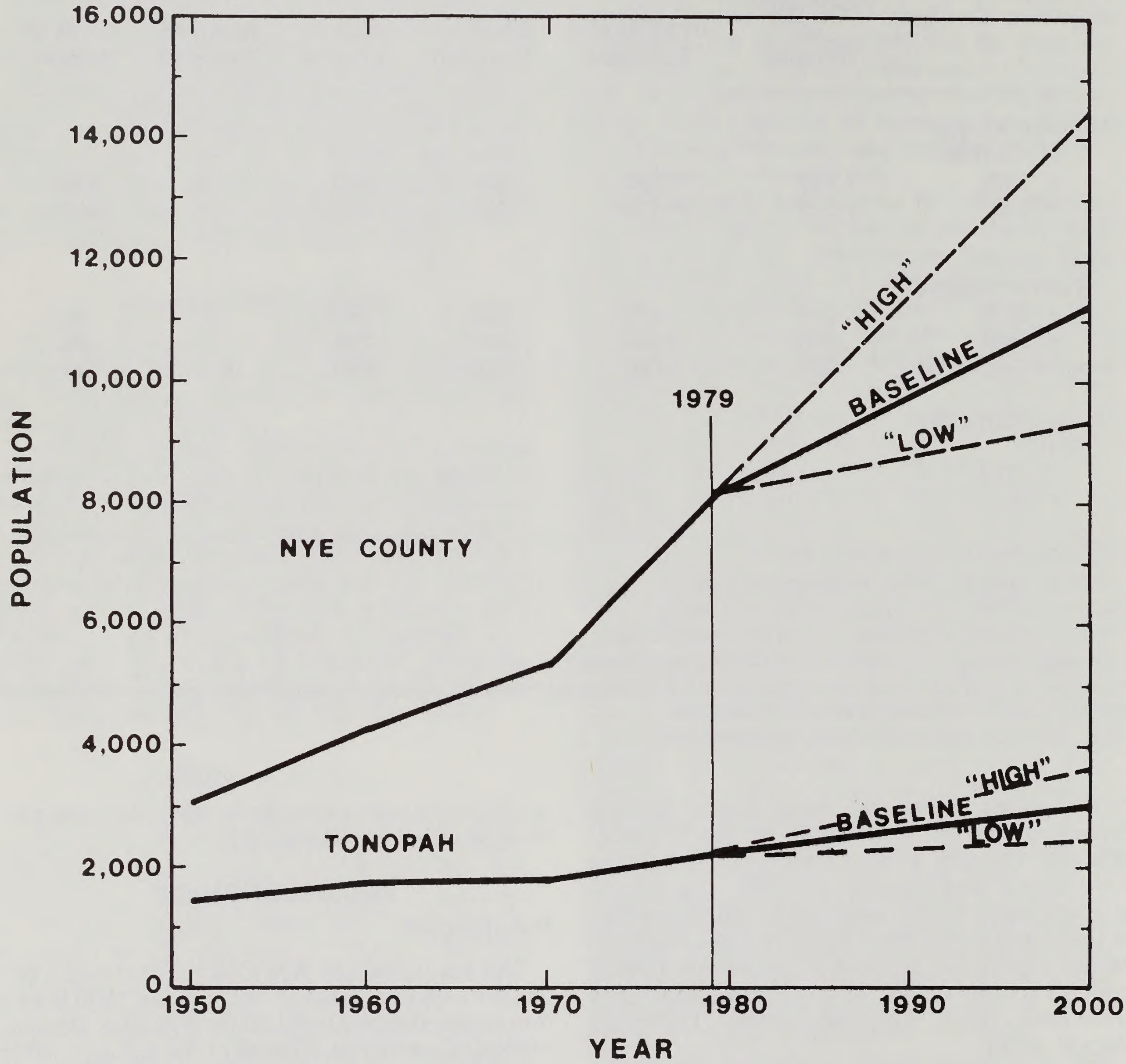


Figure 2-2. Population Trends for Nye County and Tonopah, 1979-2000
Source: ERT Socioeconomic Technical Report 1980

TABLE 2-13

POPULATION OF TONOPAH AND NYE COUNTY BETWEEN 1950 AND 1979

	1950	1960	1970	1979
Nye County	3,101	4,374	5,599	7,994
Tonopah	1,375	1,679	1,716	2,100[1]

[1]ERT Socioeconomic technical Report 1980

Source: U.S. Bureau of the Census

Components of change in the population show that natural increase accounted for only about 17 percent of the total growth, while 83 percent can be attributed to net in-migration. An analysis of the distribution of the Nye County population by sex and age groups indicates that the percentage of females in the county has increased from 43.6 percent in 1970 to 46.2 percent in 1979. In addition, it shows substantially greater growth in age groups under 30 years of age than in the population as a whole. This suggests that there will be a tendency for greater natural increase in coming years, barring significant out-migration (ERT Socioeconomic Technical Report 1980).

According to 1970 census data, distribution of the Nye County population by race/ethnicity indicates whites comprised 94.6 percent of the total population (5,297 persons). American Indians numbered 227 (4.1 percent), blacks numbered 41 (0.7 percent) and 34 (0.6 percent) were listed as "other" (U.S. Bureau of the Census 1970).

Projections of Nye County and Tonopah populations were based on the assumption that recent population trends will continue. Three alternative trends were considered as potential baselines for future population levels in the absence of the Proposed Action. These trends are illustrated in Figure 2-2. The "high" trend line is a continuation of the growth trend which occurred between 1970 and 1979. An assumed population growth of 10 percent between 1979 and 1990 was used to derive the "low" trend line. The trend chosen for the "baseline" was estimated using population trend data for the period 1950-1979. This trend was thought to provide a more realistic representation of the long-term stabilized growth which has been occurring in Nye County.

The population of the town of Tonopah was assumed to remain constant at 26.3 percent of the total Nye County population. Projected population estimates for Nye County and Tonopah are presented in Table 2-14. The baseline population estimates show the

TABLE 2-14

TRENDED BASELINE POPULATION
NYE COUNTY AND TONOPAH

Year	Nye County	Tonopah
1979	7,994	2,100
1980	8,160	2,145
1981	8,325	2,190
1982	8,490	2,235
1983	8,645	2,275
1988	9,460	2,490
1993	10,275	2,700
1998	11,090	2,915
2001	11,580	3,045

Source: ERT Socioeconomics Technical Report 1980.

population of Tonopah increasing from 2,100 in 1979 to 3,045 in 2001.

Employment and Income

Employment in Nye County demonstrated a slow but healthy average annual growth rate of 1.9 percent from 1970 to 1976. Employment by major economic sector for the two years is shown in Table 2-15. These figures indicate that Nye County has a much higher percentage of employment in the mining sector than does the nation as a whole. Nye County also has above average employment in agriculture, services, and government. These four are considered to be "basic employment" sectors in the Nye County economy (ERT Socioeconomic Technical Report 1980). Except for agriculture, they are also the sectors demonstrating the most significant employment growth from 1970 to 1976. Agriculture grew at a much slower rate, but did so in the face of declining agricultural employment nationally.

Other major economic sectors were average or below average in percentage of total employment compared with the nation as a whole. Manufacturing, especially, was substantially below the national average in employment percentage.

According to economic base theory, growth in basic employment sectors stimulates additional growth in non-basic sectors. This "multiplier" effect has been estimated at 2.4 for Nye County. In other words, for every job added in a basic sector, an average of 1.4 jobs would be generated in non-basic sectors for a total employment increase of 2.4 jobs. A similar computation using income as the variable shows that for every dollar of basic income, $1.3 would be generated in secondary income (ERT Socioeconomic Technical Report 1980).

The unemployment rate in Nye County has been consistently lower than either the Nevada State unemployment rate or the U.S. unemployment rate in recent years as shown in Table 2-16.

Estimated per capita income for Nye County lags behind both state and national figures as illustrated in Table 2-17. In addition, the rate of increase from 1974 to 1977 was notably lower for the county which resulted in Nye County falling further behind Nevada and U.S. per capita income figures by 1977. Total personal income in Nye County in 1977 was $34.6 million.

In the absence of the proposed project, the Nye County economy is expected to remain strong, with limited but steady growth. Most of the growth is expected to result from continued mineral, oil, and gas exploration and development. Several mining projects have been iden-

TABLE 2-15

NYE COUNTY EMPLOYMENT BY MAJOR ECONOMIC SECTOR

Sector	1970 Employment	1976 Employment
Agriculture	156	175
Mining	325	510
Construction	406	90
Manufacturing	61	40
T.P.U.C.[1]	132	100
Trade	408	310
F.I.R.E.[2]	40	140
Services[3]	563	777[4]
Government	434	731
TOTAL	2,525	2,833

[1]Transportation, Public Utilities, and Communications
[2]Finance, Insurance and Real Estate
[3]Includes nonfarm proprietors
[4]Does not include 2,800 employees commuting from Clark County to the Nevada Test Site
Sources: Nevada Employment Security Department. 1978. Area Labor Review - Balance of State, 1978.

TABLE 2-16

UNEMPLOYMENT RATES FOR SELECTED YEARS[1]

	1976	1977	1978	1979[2]
Nye County	4.7%	5.1%	2.1%	2.4%
Nevada	9.0%	7.0%	4.5%	5.7%
United States	7.7%	7.0%	6.0%	5.7%

[1]Seasonally adjusted

[2]Rate for July, 1979

Sources: Nevada Employment Security Department, Nevada and County Labor Force Summaries, 1976, 1977, 1978, and 1979.

tified which are likely to begin operations, thereby increasing employment in the mining sector.

There are also several Federal projects under consideration for Nye County that could increase employment over the baseline levels. These include a possible relocation of additional employees to the Tonopah Test Range (TTR), increased activities by Sandia Labs, and the possible demilitarization of some of the work at the TTR. Finally, construction of the MX missile system may affect Nye County in the future.

Development of any of these projects would result in continued growth of the Nye County economy, resulting in a low unemployment rate and increased personal income. If all the projects were to start up concurrently or in rapid sequence, the current county population would not be able to supply the needed labor, which would lead to more in-migration, and population increases above the baseline population trends. Such growth would tend to be more like what occurred between 1970 and 1979, (i.e., the "high" scenario in Figure 2-2) and would translate into the need for more goods, services, facilities, etc., and thus more employment.

Public Financial Resources

Nye County supports basic public facilities and services such as the county sheriff, road and bridge maintenance, the county hospital, and administrative functions of the county clerk, treasurer, assessor, and the district attorney. Nye County expenditures have increased from $3,618,014 in 1969-70 to a projected $5,733,995 in 1979-80, a total increase of 58.5 percent, or 4.7 percent per year compounded. During the same time period, revenues grew from $4,463,405 to $6,304,734, a total increase of 41.3 percent of 3.5 percent per year compounded. Nye County population grew at 3.7 percent per year, compounded, during the same period. Budget allocations for 1979-80 are shown in Table 2-18 (Smith 1970; ERT Socioeconomic Technical Report 1980).

The county has a relatively broad revenue base. Approximately 26 percent of revenues are

TABLE 2-17

ESTIMATED PER CAPITA PERSONAL INCOME

	1974	1975	1976	1977
Nye County	$4,817	$5,097	$5,356	$5.767
Nevada	6,067	6,595	7,162	7,980
United States	5,428	5,852	6,399	7,026

Source: Nevada Employment Security Department, *Area Labor Review—Balance of State 1978* and U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System, April 1979.

TABLE 2-18

NYE COUNTY BUDGET ALLOCATIONS 1979-80

	Amounts	Percent of Total
Administration	$1,594,377	27.8
Public and Safety	1,002,030	17.5
Health	1,528,575	26.7
Public Works	1,564,654	27.3
Parks and Recreation	25,000	.4
Other	19,359	.3
Total	$5,733,995	100.0

Source: Nye County, 1979-80 Budget.

generated from the local property tax; 23 percent from other governments (state and Federal) and grants; and 19 percent from licenses, fines, and fees. The remaining 32 percent comes from existing balances and miscellaneous other revenue sources. Key local factors affecting revenues are population (which affects licenses), fees and some government grants, and property values. The Nye County property tax base (total assessed valuation) is currently estimated at $104,573,000, up from $24,772,000 in 1970-71. The tax rate, meanwhile, fluctuated between $1.55 and $2.37 per $100 of assessed value and currently is $1.63. As shown by Table 2-19, the result has been that property tax revenues have increased at an average of 16.8 percent per year. When compared with the 3.5 percent per year growth in total revenues over the past decade, this reflects Nye County's increasing dependence on the property tax to support local public services.

In addition to providing county-wide services, the Board of County Commissioners is responsible for formulating and/or approving the budgets of unincorporated taxing districts such as the town of Tonopah. Tonopah supplements county services with fire protection, water and sewer services, and park and recreation services. The Tonopah Advisory Council, an elected board, assists the county commissioners in preparing the town budget and represents the community before the county commissioners. The Tonopah general fund budget for 1979-80 is shown in Table 2-20.

In addition, Tonopah's overall budget includes three self-sustaining special funds. The funds provide for operation of the Tonopah Convention Center, the swimming pool and park, and the Tonopah Public Utilities Company, using revenues produced by each facility, respectively.

Tonopah will derive an estimated 61 percent of its 1979-80 revenue from property taxes, a relatively high level of dependence on a single revenue type which is further accentuated by the fact that no other source provides more than 18 percent of the town's revenue. The property tax rate for Tonopah has varied in a range from $0.50 to $1.30 (1979-80 rate) per $100 of assessed valuation. With a continually growing assessment base, the town's annual property tax revenue has fluctuated with the tax rate as shown in Table 2-19.

Major capital expenditures by either Nye County or the town of Tonopah typically require debt financing. The county's debt capacity is limited to 10 percent of assessed valuation of $10,457,300 in fiscal 1979-80. The outstanding debt as of July 1, 1979, was $820,165, well below the limit. Tonopah's debt capacity limit is 15 percent of assessed valuation, or $969,658, substantially above the $53,784 existing debt. However, local government debt financing depends in most cases on general obligation bonding which is restricted in Nevada by a state-imposed limit on the property tax rate.

The future public finance picture in Nye County and Tonopah without the Proposed Action depends on four key variables: the effect of recently enacted state legislation limiting property tax rates and local government spending, the population, the property tax base, and the availability of state and Federal funding.

TABLE 2-19

NYE COUNTY AND TONOPAH ASSESSED VALUATION
1970-71 to 1979-80

Fiscal Year	Assessed Valuation	Percent Change	Local Government Unit Rate	Property Tax Revenue
		Nye County		
1970-71	$ 24,772,000		1.70	$ 421,124
1971-72	27,915,000	12.6%	2.37	661,586
1972-73	32,825,000	14.0%	2.36	754,253
1973-74	45,032,000	41.5%	1.55	697,996
1974-75	48,600,000	7.9%	1.65	801,900
1975-76	58,490,000	20.3%	1.57	918,293
1976-77	62,414,000	6.7%	1.75	1,092,245
1977-78	79,518,000	27.4%	1.57	1,248,433
1978-79	89,969,000	13.1%	1.66	1,493,485
1979-80	104,573,000	16.2%	1.63	1,704,540
		Tonopah		
1970-71	$4,062,581		1.10	$44,689
1971-72	4,450,562	9.6%	.50	22,253
1972-73	4,715,106	5.9%	.50	23,576
1973-74	$4,915,121	4.2%	1.00	$49,151
1974-75	5,150,732	4.8%	1.05	54,083
1975-76	5,556,997	7.9%	1.04	57,793
1976-77	5,984,715	7.7%	.98	58,650
1977-78	6,150,101	2.8%	.83	51,046
1978-79	6,373,606	3.6%	1.19	75,846
1979-80	6,464,384	1.4%	1.30	84,037

Sources: Nevada Tax Commission, *Local Government Red Book: Ad Valorem Tax Rates, Budget Summaries for Nevada Local Governments,* Fiscal Years 1970-71 through 1979-80.
Town of Tonopah, Nevada. 1979. *Tonopah Town Budget 1979-80.*

Nye County and Tonopah are restricted by state limitations on both spending and property tax rates. The property tax rate maximum limit is currently $3.64 per $100 of assessed value, including all levies on a given piece of property. Under certain circumstances, however, an additional $.30 per $100 is available, earmarked for the local school district (ERT Socioeconomics Technical Report 1980). As an example of the rate limit, land in the Tonopah taxing district is taxed $1.30 per $100 of assessed value by the town, $1.63 per $100 by the county, $0.45 per $100 by the school district and $0.21 per $100 by other taxing bodies for a total of $3.59 per $100 of assessed value. Within the state-imposed limit of $3.64 per $100, only $0.05 per $100 is left for all other demands including special assessment districts, town or county bonding, and increased revenue needs for any of the taxing bodies.

In addition to the property tax rate limitation, the State of Nevada has limited local government spending. The spending limit for a given local jurisdiction is tied to population growth and the U.S. Department of Commerce Urban Consumers Consumer Price Index to permit accommodation of externally generated increases in demand for local services. However, the population growth factor is based on the previous year's growth, thus limiting a local jurisdiction's ability to respond to current growth or to plan for expected growth. Expenditure growth consequently lags behind population growth by at least one year.

Population change will affect local public finances in two ways. First, it is a factor used

TABLE 2-20

TONOPAH GENERAL FUND BUDGET
1979-80

	Amount	Percent of Total
Fire Department	$ 77,500	73
Library	3,700	3
Building and Grounds	5,300	5
Other	20,000	19
Total	$106,500	100

Source: Town of Tonopah, *Tonopah Town Budget 1979-80.*

to calculate the annual local government spending limits described above. Second, it also affects demand for services and facilities provided by local government.

Total assessed valuation of the property tax base is expected to continue to increase at or above the rate of increase of the population providing an increased revenue base. Other population-related revenues should also keep pace with population growth. Assuming other funding sources, including state and Federal sources, continue, county revenues are expected to keep pace with service needs. Problem areas will be the lag time inherent in the state-imposed spending limit and the effect of the property tax rate limit on the county's ability to finance major capital expenditures.

Tonopah should be in a similar public finance position in the future without the proposed project. Assessed valuation growth is expected to keep pace with or exceed population growth. The lag time in the expenditure limit will keep expenditures in line with revenues, but services may lag behind demand.

Both Tonopah and Nye County have substantial bonding capacity available, should capital improvement programs be undertaken. However, the tax rate limitations would constrain their ability to use the capacity if the cost of new debt, coupled with existing obligation, exceeded the maximum revenue available under the rate limits.

Housing

In 1970, Nye County contained 2,093 dwelling units. Of these, 1,813 or 86.6 percent were occupied; 1,271 (60.7 percent) were single-family dwelling units, 256 (12.2 percent) were multi-family units, and 566 (27 percent) were mobile homes. The total number of units was 8.1 percent higher than in 1960. The number of mobile homes had increased nearly 125 percent during the same period, indicating an increased dependence on mobile homes as permanent housing. The 1970 Census also reported that 26 percent, or 476, of the 1,813 occupied units were lacking some or all plumbing facilities, or were over-crowded, i.e., greater than 1.01 persons per room.

The vacancy rate reported in 1970 in Nye County was over 13 percent. With an area as large as Nye County, this may not be a valid indication of the housing situation in any given community, since it is possible that there could have been housing shortages in particular areas and even larger vacancy rates in others due to uneven distribution of the population and the housing stock.

Nye County does not issue building permits; therefore, very little data are available from which to estimate changes in the housing situation in Nye County since 1970. Given the lack of data available to update the local housing situation, baseline housing needs were projected based on the assumption that the demand for housing is directly related to the population and all growth will require a proportionate increase in the housing stock. No additional demand for upgrading or replacing housing stock was factored in. It was also assumed that one additional housing unit would be required for each additional 2.8 persons, the average number of persons per household in Nye County in 1970.

Additions to the housing supply were estimated to be 95 dwelling units per year, based on the assumption that one additional unit was built for every 2.8 additional persons in Nye County between 1970 and 1979 (see Appendix I). It is expected that mobile homes will con-

Table 2-21

HOUSING REQUIREMENTS FOR THE BASELINE POPULATION, NYE COUNTY

Year	Total Estimated Demand[1]	Total Estimated Supply	Excess Supply
1980	59	95	36
1981	59	95	36
1982	59	95	36
1983	59	95	36
1984-1988	291	475	184
1989-1993	291	475	184
1994-1998	291	475	184
1999-2001	173	285	112
Totals	1,282	2,090	808

[1]Five-year totals, (i.e., 291 total dwelling units), do not equal five times annual figure (i.e., 59 total dwelling units) due to rounding.

Source: ERT Socioeconomics Technical Report 1980.

tinue to account for an increasing share of the new homes in Nye County. The resulting future baseline housing situation is shown in Table 2-21. As shown, the estimated additions to the housing supply exceed the estimated demand for that housing by 36 units per year. Obviously, excess housing would not continue to be built unless the supporting demand was available; rather the excess supply shown in Table 2-21 represents additional housing potential which could be built if needed.

The 1970 U.S. Census did not distinguish housing information for the town of Tonopah. Discussions with local officials indicated that the housing stock in town consists mainly of single-family dwellings and mobile homes with a limited number of multi-family dwellings. There have been only a few additions to the housing stock recently, mostly single-family dwellings and mobile homes, and there continue to be problems with substandard housing. The housing situation is very tight, with few vacancies either for sale or for rent. Rental rates are fairly moderate, currently ranging from $160 to $200 per month for a furnished unit, including utilities, at the only large apartment house in Tonopah, although there are no vacancies. Thus, problems are related more to availability than cost. Another indication of the housing situation is that the U.S. Air Force has rented two complete motels (110 rooms) on a long-term basis to provide housing for airmen from Clark County.

If the population growth assumed for the baseline occurs, Tonopah's share of the total housing needs would be equal to its share of the total population (i.e., 26.3 percent). Based on the same dwelling unit mix assumed for all of Nye County above, Tonopah will require an additional 337 dwelling units between 1980 and 2001. Assuming that the construction of new dwelling units will respond to the demand in the appropriate location, no major problems are expected in providing the needed housing in Tonopah. However, if the demand for housing increased beyond the anticipated levels, problems could arise from: (1) the limited construction trades industry in Tonopah, and (2) a limited amount of readily developable land.

Attitudes and Life Styles

The culture and attitudes of the people of Nye County largely reflect the history and geography of the area. Local residents generally share in the traditional value systems and social structures typical of isolated rural areas of the west, modified somewhat by the "boom and bust" characteristics of mining activity and fluctuation in military employment in the area. These intermittent cycles of rapid growth and decline have historically been partially offset by a number of stabilizing factors; including Tonopah's continuing role as county seat and administrative center for government agencies, such as the Bureau of Land Management (BLM)

and the Forest Service; the city's role as a service center for tourism fostered by its location on a major highway between major urban centers; and the influence of agriculture, primarily ranching, on the local economy and lifestyle (Ganzel 1976).

While certain attitudes are shared by most residents of Nye County, some differences do prevail among various social groups. In general, social attitudes and mores are basically conservative and have been marked by relatively slower rates of change than other parts of the country. New social norms and patterns are slow to be accepted, and any social change has a tendency to be seen as "radical." The history of open range and frontier ethics has had a strong influence on community reaction to the issues raised by increased development. Many residents are opposed to land use controls, especially where planning and zoning interfere with what is perceived as the individual's right to do with his property as he sees fit. Residents are also concerned about the control of vast amounts of land by the BLM. They feel that the land is not being managed to their best interests and that continued BLM planning and management may impede further economic development (U.S.D.I., Bureau of Land Management 1976).

According to Ganzel, some differences in orientation exist between the more traditional ranching groups and townspeople. Ranchers tend to place greater emphasis on frontier values such as strong family ties, attachment to the land and its traditional uses, and personal initiative bordering on "rugged individualism." These attitudes are most strongly held by small ranchers who perceive ranching as a lifestyle, as opposed to owners of larger ranches who view agriculture more as a business. The ranchers as a group take pride in making their living from a land which yields its bounty only to hard work and protracted struggle (Ganzel 1976).

While the townspeople share many of the same attitudes and social and political values as their rural neighbors, their orientation is more directed towards the "outside world." This is particularly true of the government employees, military personnel, teachers and other professionals who are not long-time residents and have ties and associations to other locales. Merchants and businessmen who are long-time residents share in this outward orientation, although to a lesser degree, because of their economic dependence on tourism and development (Ganzel 1976).

In the face of new development in both the mining and military sectors, local attitudes are mixed. Long-time residents of Tonopah and ranchers are somewhat wary of the disruption that new development might bring, but at the same time they would like to see some stimulus of the local economy. The "newcomer" group of Tonopah, with more outside-oriented views, and many local businessmen are anxious for the benefits that development can bring. This pattern is typical of rural communities faced with the prospect of rapid growth and possible major changes in their community and lifestyle (Institute for Social Science Research 1974).

The town of Tonopah has experienced both "boom" times and "dry spells," but continues to exist today as a small, rural, western community. Citizens do not fear or resist change, but they are cautious about the kind of uncontrolled growth that might threaten their traditional values and sense of community.

Community Facilities and Services

Schools

The Nye County School District provides public education, kindergarten through twelfth grade, for most of the county residents and some residents from other counties. A seven-member school board is responsible for establishing district policies and for appointing a superintendent, who is responsible for day-to-day operations. The district operates schools in Armagosa Valley, Beatty, Duckwater, Gabbs, Pahrump, Round Mountain, Tonopah, and a rural school in Fallini. Only the Tonopah schools will be analyzed in detail, since enrollment increases from the Proposed Action would be reflected in that enrollment area. Three factors considered in the analysis are facility capacity, student/teacher ratios, and financial resources, all of which are directly related to enrollment.

School enrollments for Tonopah and the Nye County School District are shown in Table 2-22. Total district enrollment has grown at an annual rate of 5.5 percent between 1974-75 and 1979-80. During the same period, Tonopah enrollment grew at a 3.0 percent rate. Although not shown, enrollment growth has been greatest in the Pahrump area. The Pahrump schools' enrollment nearly doubled from 1975-76 to 1979-80, accounting for 77 percent of the total growth in the district's enrollment (Nye County School District no date).

Schools in Tonopah are located on one site which is considered as a campus. One building is used solely for elementary education while two buildings house grades seven through twelve. Other buildings on the site include a

TABLE 2-22

ENROLLMENT HISTORY, NYE COUNTY SCHOOL DISTRICT AND TONOPAH, 1974-1980

School	1974/75	1975/76	1976/77	1977/78	1978/79[1]	1979/80[1]	Change(%)
Tonopah	424	421	410	402	470	492	+16
Total District Enrollment	1,338	1,405	1,381	1,455	1,698	1,752	+31

[1]End of first school month
Source: Nye County School District, Bond Issue Information, November 1979

gymnasium/music building, a shop, and an administration building. An athletic field is located nearby with a football field and running track. The superintendent indicated that the facility's overall capacity is about 630 students; however, some classes, such as special education, utilize standard classroom space for a small class (Johnson, personal communication 1979).

The number of teachers budgeted for the 1979-80 school year and the resulting teacher/student ratio for Tonopah and the total district are 24 and 1:21, and 92 and 1:19, respectively. The teacher/student ratio nearly equaled or bettered the 1:20 ratio the district planned for 1979-80, as well as the minimum standard of one per 25 students. Teacher/student ratios of some programs such as special education classes or bilingual classes are much lower. Recruiting teachers is currently a problem in Nye County due to the lack of available housing (Johnson, personal communication 1979; Nye County School District 1979).

Financial resources of the district reflect the major role of the state in funding public education in Nevada. The 1979-80 budget anticipates 71 percent of revenues from the state, 21 percent from the county, and 8 percent from other sources. The heavy state support of education was made necessary by the taxing limitations imposed by the state legislature which reduced the maximum levy the school district could assess from $1.50 per $100 of assessed valuation to $0.50 per $100. The state support is intended to offset the resulting reduction in property tax revenues (see ERT Socioeconomics Technical Report 1980). The district currently assesses a rate of $0.45 per $100 of assessed valuation. The district's property tax base is the same as Nye County's (Table 2-19). Expenditures are also under state-imposed spending limitations based on enrollment growth related to the average three previous years' property tax base and the consumer price index. The average expenditure per student planned in 1979-80 is $2,238, compared with $2,344 in 1977-78 (Nye County School District 1979).

The district relies on general obligation bonds to finance major capital improvements. Three outstanding issues have a total balance of $2,345,000. This represents 11.2 percent of the district's total debt capacity of $20,914,000 (Nye County School District 1979).

Enrollment projections for the district indicate an increasing enrollment that will reach approximately 2,035 students by 1987-88 and 2,500 students by 2000-2001 (see Table 2-23). Tonopah enrollment is expected to reach 570 and 697 students, respectively, reflecting growth at about half the district rate. Based on these projections, Tonopah school facilities will be at capacity in the early 1990s and will fall short of meeting enrollment needs by approximately 70 spaces in 2000-2001. Teaching staff requirements in 2000-2001 are estimated to be 100 for the district, eight more than the present level; with four of the eight needed for Tonopah. Recruiting the necessary teachers could continue to be a problem if the tight housing situation does not improve.

As enrollment increases through 2001, the school district should be able to meet operating and maintenance expenses based on the existing formula for determining expenditure and revenue ceilings, and the state's support of education. The formula incorporates the current enrollment to determine the level of spending permitted and subsequent state revenue contributions. If enrollment increases by more than 3.0 percent during the school year, the district is able to adjust its spending ceiling upward from the budgeted figure for the current year.

The voters of Nye County recently defeated a proposed $2.5 million bond issue which would have expanded or improved schools in Amargosa, Pahrump, and Tonopah. Although the bond issue was defeated, the school

TABLE 2-23

CURRENT AND BASELINE ENROLLMENTS, NYE COUNTY SCHOOL DISTRICT

	1979-80	1980-81	1981-82	1982-83	1987-88	1992-93	1997-98	2000-2001
Total	1,794[1]	1,790[2]	1,825[2]	1,890[2]	2,035[2]	2,210[2]	2,385[2]	2,490[2]
Tonopah								
K-6	228	235	240	244	268	291	314	328
7-12	265	266	271	276	302	329	354	369
	493[1]	501[2]	511[2]	520[2]	570[2]	620[2]	668[2]	697[2]

Source: [1]Nye County School District. Monthly Enrollment Report for Nye County School District. August 27, 1979, to September 21,1979.

[2]ERT Socioeconomics Technical Report 1980.

district's analysis supporting the bond issue indicated that such a bond issue could be financed within the existing taxing limitations. Thus, as the district continues to plan for its future needs, it does have bonding capacity available.

Health

Health care in the study area is provided by various state and local agencies. Nye General Hospital, built in 1971 in Tonopah, is the only hospital in the county providing both acute and long-term care, with 21 beds for acute care and 24 for long-term care. It offers a wide variety of primary and secondary treatment, covering nearly all areas of health care. Occupancy rates are relatively low, averaging around 20 percent for the acute care and 60 percent for the long-term care beds. The low rates reflect excess capacity available because the hospital was built to serve a substantially larger population than the current population of the Tonopah area. Two physicians under contract with the Central Nevada Rural Health Consortium (CNRHC) practice at the hospital. There are twelve nurses (RNs and LPNs) and a number of support and administrative personnel. The hospital currently requires an operating subsidy from the county since operating revenues do not meet expenses. Two primary causes, among several, for the revenue shortfall are the low occupancy rates and a fairly high rate of uncollectable billings (Friel, personal communication 1979).

The CNRHC provides primary heatlh care in four rural Nevada counties, including Nye. Its program use Federal assistance funds to establish and maintain a variety of services. These include: operating clinics in rural communities, e.g., its clinic in Tonopah is located at the hospital; contracting with doctors, physicians' assistants and specialists to staff its programs, either on a part-time or full-time basis; operating pharmacies in its clinics; and recently, providing dental care services. Once established, the clinics are to use revenues collected for services to reduce or eliminate the need for assistance. In addition to the two physicians described above (who practice at the Tonopah clinic), the consortium has three dentists, two physicians' assistants, and five medical assistants to provide care in Nye County, plus support and administrative staff (Kudner, personal communication 1979).

A public health nurse is located in Tonopah, serving Nye and Esmeralda counties. A variety of services are provided, including immunization clinics, family planning services, and nutrition counseling. The nurse also serves as the nurse for the school districts. Service is provided on a regularly scheduled basis throughout the county (Jordan, personal communication 1979).

Emergency medical treatment and rescue services are provided through three groups or organizations: the volunteer ambulance program, the Nye County Search and Rescue Group, and the Tonopah Fire Department. Ambulances are located in Tonopah, Round Mountain, and Manhattan, as well as throughout Nye County. These are staffed by volunteer personnel, most of whom are Emergency Medical Technicians (EMTs). Emergency air ambulance service is available locally, coordinated through Nye General Hospital (ERT Socioeconomic Technical Report 1980).

The Nye County Search and Rescue group operates primarily in cases involving downed planes, lost parties, or mine disasters. Its primary objective is to locate and rescue victims, allowing other agencies to provide emergency health care (Wolfe, personal communication 1979).

Finally, the Tonopah Fire Department offers a fast response emergency rescue service in Tonopah and surrounding areas of Nye and Esmeralda counties. Staffed by fully-equipped, trained paramedics, it operates when the purpose is to rescue and stabilize victims for transport by the volunteer ambulance service (Jeffrey, personal communication 1979).

Under the baseline scenario, few changes are expected in health services. An increased population would result in an increased occupancy rate for the hospital and an increase in the number of patients for doctors and dentists seeking to establish practices, and the consortium clinic. These effects can be viewed as beneficial, in that they help support increased provision of health care services. In fact, it was noted that if growth results in more emergency situations, the quality of care may improve due to increased proficiency of personnel. No additional staff would be needed at the hospital, or by the emergency service groups. The population growth could, however, require additional staff for the CNRHC to operate its programs, e.g., another doctor or physician's assistant at the Tonopah clinic.

Law Enforcement

The three principal law enforcement agencies in Nye County are the sheriff's department, the court system, and the state highway patrol. The sheriff's department serves the entire county with substations in the major population centers. With 33 officers, the sheriff's department has a ratio of 4.1 officers per 1,000 population, a relatively high staffing level for a rural area. The high staffing level reflects the large area of the county and the distances between population centers, more than the actual population.

The department has 19 vehicles, several of which are in need of replacement. Offices, cells, and dispatch facilities are maintained in Tonopah, Beatty, and Pahrump. Dispatch services are currently inadequate because the topography prevents full-time communication between the dispatch centers in Tonopah and Pahrump and the vehicles. Thus, much of the communication is via telephone. The department is currently experiencing some labor problems, e.g., staff turnover. The sheriff attributes this to overwork, insufficient job satisfaction, and inadequate pay scales.

The sheriff's department is currently engaged in several programs which will expand its capacity to provide adequate service. These programs include the planning of new substations for Lathrop Wells and Gabbs and linking the department to a statewide radio system which will allow for continuous radio contact with vehicles throughout the county.

The sheriff expressed a desire to improve the departments' quality of service by increasing the staff and the number of vehicles. While a formal proposal to implement the program has not been presented to the county commissioners, the sheriff's goal is to provide 24-hour coverage, i.e., five officers for each service area and to provide a vehicle for each officer. If such a program were adopted, it would require a total of eleven additional deputies and 24 vehicles, i.e., 13 for the existing staff and 11 for the new staff (ERT Socioeconomic Technical Report 1980). The ongoing facilities and communications improvement program will, when completed, provide for improved service for both ʼe existing and baseline needs.

The local judicial system is comprised of two courts and several county and state agencies. The 5th Judicial District Court, located in Tonopah, is the principal court; its jurisdiction includes major felonious crimes and civil cases. One judge is assigned to the 5th Judicial District. The Justice Court has local jurisdiction in misdemeanors, traffic violations, and minor civil cases. It is presided over by a justice of the peace. Justice courts are located in Tonopah, Gabbs, Beatty, and Pahrump. Both courts also have court clerks working with the court.

Other agencies working in cooperation with the judicial systems include the Nye County District Attorney's office, the Nye County Juvenile Probation Department, and the Nevada State Public Defender's office in Carson City. Each of these agencies plays a role in the representation of the county's or state's interests, working with juveniles in prevention and/or rehabilitation programs, or providing for public defenders where needed. With the exception of the State Public Defender's office located in Carson City, the offices and staff of these agencies are located in Tonopah (Knight, personal communication 1979).

Baseline growth would affect these agencies in two ways: increased case loads and increased work loads in support of local government administrative functions. Such changes would translate into increased staffing needs, though the number, timing, and specific agencies are uncertain.

The Nevada State Highway Patrol jointly serves Esmeralda and Nye Counties. Two resident patrolmen are located in Tonopah and one is located in Beatty. The patrol is planning to locate a resident patrolman in Pahrump. Highway Patrol offices in Tonopah are housed in their own building, and dispatch services are

provided out of Las Vegas. Baseline growth is not expected to affect the patrol (Tingle, personal communication 1979).

Fire Protection

Fire protection in Nye County is provided primarily by Federal agencies and volunteer rural organizations. Federal agencies have primary responsibility for fire control on the lands under their respective jurisdictions. Because the Federal land districts do not coincide with the county boundaries, agencies involved with fire control in Nye County include several districts of the BLM, the U.S. Forest Service, and the agencies or contractors responsible for fire control at the Nevada Test Site.

Outside of the Federal lands, which comprise over 94 percent of the county, fire protection is provided by volunteer fire departments. Equipment is located throughout the county, although the type and condition of the equipment and facilities varies greatly. The volunteer fire departments often share facilities and personnel with the rural volunteer ambulance services. Although, there are no formal mutual aid pacts in Nye County, men and units from several locations cooperate to fight serious fires.

The Tonopah Fire Department provides fire protection and rescue services in Tonopah. It is funded by the town of Tonopah. The department's primary service area includes Tonopah and the area within an 8-mile radius around the town, including the airport. It also sends units to outlying areas, if requested to do so by a rural fire department or by the sheriff's office, and if it will not significantly decrease the level of protection afforded the town.

Current staffing includes five full-time paid professional and 30 volunteer firefighters. First-response responsibilities are scheduled such that the initial response always includes at least one professional (two or three during the day) and four volunteers. All firefighters are equipped with radio communication devices.

The fire station, completed in 1974, provides sufficient space for current needs, plus some excess capacity. The department's equipment inventory list is given in Table 2-24. The current equipment provides a combined pumping capacity of 2,500 gallons per minute (gpm), a storage capacity of 1,935 gallons, and 5,500 feet of hose. Based on recognized planning standards, the fire department provides more than adequate capacity for the existing and baseline needs (ERT Socioeconomic Technical Report 1980).

The town's water distribution and storage system is completely adequate for most firefighting needs. It provides approximately 1.9 million gallons of storage, and delivers sufficient pressure in most areas so that pumping is not needed. Tonopah has a Class 6 fire insurance rating, which is high for a rural community of its size (Jeffrey, personal communication 1979).

The Tonopah Fire Department also provides rescue service to Tonopah and the surrounding area. The rescue team includes 19 EMTs, with four more currently enrolled in training courses.

Under the baseline scenario, no significant changes are expected in fire protection. Most additional growth is expected to be concentrated in existing population centers which have organized fire protection.

Public Utilities and Communications

Electrical, telephone, and propane gas services are provided locally by private companies, including the Sierra Pacific Power Company (SPPCo), the Nevada Telephone and Telegraph Company (NT&T), and the Cal-Gas and Pargas companies, respectively. These companies provide services in the Tonopah, Manhattan, and Round Mountain areas. Discussions with officials of three of the companies indicated that their operations are either currently in a position to provide for the projected baseline growth or they are making plans to be able to provide additional capacity. Expansion programs include: the addition of switching equipment for 400 more telephone lines by NT&T to be completed in early 1980 and a doubling of the power transmission system capacity for Tonopah by SPPCo to be completed in 1981. The SPPCo system is flexible enough to allow incremental increases in capacity to maintain adequate service levels (Van Pool, personal communication 1979; Carder, personal communication 1979; Demetras, personal communication 1979).

A cable television company, Tonopah Television, Inc., is operating in Tonopah, and there is one local newspaper, *The Tonopah Times Bonanza,* a weekly paper covering primarily local and regional news. Several major regional daily newspapers from Reno and Las Vegas are also available in Tonopah.

Water

Tonopah Public Utilities (TPU) provides water to residents of Tonopah and to a few locations outside of town. The water supply is groundwater from the Ralston Valley, approximately 18 miles north of town. Water is pumped from

TABLE 2-24

TONOPAH FIRE DEPARTMENT EQUIPMENT INVENTORY

Vehicle	Condition	Description
1978 Ford Rescue	Excellent	Fully equipped, EMT kits, oxygen tanks, etc.
1968 Howe Ford Pumper	Excellent	1,000 gpm pumper, 1,000 gal. storage, 1,200-foot hose
1966 Ford Pumper	Excellent	750 gpm pumper, 935 gal. storage, 1,800-foot hose
1944 American LaFrance Aerial	Excellent	65-foot aerial ladder
1942 American LaFrance Pumper	Excellent	750 gpm pumper, 2,500-foot hose

Source: Jeffrey, Fire Chief, Tonopah Fire Department. Personal communication, October 1979.

wells, through two booster stations to three storage locations with a combined capacity of 1.9 million gallons. Water quality is excellent and no treatment is required, although chlorination of stored water is necessary to reduce algae levels. The superintendent of TPU indicated that the supply is extremely reliable. The main water transmission line was recently replaced and is in good condition while the distribution system has been updated with 6- and 10-inch lines (Boscovitch and Jones, personal communication 1979).

Current water demand averages about 200 gpm based on a service population of 2,800 (including tourists). The system served a much larger population reliably during World War II and flow tests on the wells indicate they are capable of providing 670 gpm, over three times the current usage. Therefore, the baseline growth is not expected to create any water supply problems, although some expansion of the distribution system may be necessary depending on where the growth occurs (Pillsbury 1979).

Wastewater

Tonopah Public Utilities (TPU) provides wastewater disposal and treatment services in Tonopah. At present there are over 700 residential and 90 commercial taps on the system (Boscovitch and Jones, personal communication 1979). The system is now at capacity and does not meet state environmental quality standards. Thus, only limited new hookups are being allowed until an acceptable treatment plant is constructed and operating.

A wastewater facilities plan was recently completed and has been submitted to the U.S. Environmental Protection Agency (EPA) for approval. The plan includes a new treatment plant with a design capacity for 5,000 persons and expansion capability for 5,000 more. If the development plans receive approval as expected, construction would begin in July 1980, with completion estimated for December 1980. The facilities plan also includes installation of additional lines to provide service to existing homes in Tonopah which are currently on septic tanks and to accommodate future development. The estimated cost of the new plant is $888,000, $120,000 of which would be the local share. The county would initially provide the local share from the general fund, but would recoup the cost from customer charges and connection fees (Pillsbury, personal communication 1979). In addition to the treatment plant, the county is considering installing aeration devices in the existing lagoons, which would permit up to 500 additional hook-ups. A decision has not yet been made on installation of the aerators, however the pumps can be installed and operating within two weeks of a decision to proceed (Hamilton, personal communication 1980).

At the present time, the wastewater treatment facility can accommodate only limited growth. Installation of the aerators would provide adequate capacity for the immediate needs of Tonopah, while the proposed treatment plant, if constructed, would provide sufficient capacity to serve the projected baseline population to the year 2001 with a 60 percent margin of excess capacity. Given the existing situation, the assumption must be made that the permanent treatment plant will be built on schedule and therefore waste treatment capacity would be adequate for the baseline.

Solid Waste

Tonopah provides solid waste collection and disposal services under a cooperative arrangement between TPU and Nye County. TPU collects and transports refuse to a landfill which is maintained and operated by the county. The landfill is located several miles from Tonopah on 20 acres of land acquired from the BLM. Although the site was originally designed to serve 5,000 people for 20 years, approximately 3.5 acres have been filled after four years of use by a population of approximately 2,000. The rate of fill will vary with terrain but if the present rate continues, capacity of the site will be used up by the mid-1900s under the baseline population scenario. At that time additional land will be required. Nye County has identified potential expansion space near the existing facility on BLM land and discussions have begun with BLM.

The current site meets environmental quality standards despite compaction and cover problems that have led to some blowing debris. The EPA is aware of the problems and consequently has expressed concern about the effects of increased population (Hamilton, personal communication 1979; Boscovitch and Jones, personal communication 1979).

Social Services

The social services currently available in Nye County include alcohol, drug, and vocational rehabilitation and counseling; foster and shelter home programs; home care services; mental health counseling; juvenile rehabilitation programs; and supplemental assistance programs; e.g., the food stamp program (Love, personal communication 1979). Many of these services are provided by various state agencies, with personnel in either Hawthorne or Tonopah. These offices serve multi-county areas with services offered on a regularly scheduled or an as-needed basis.

The county is also involved in the provision and administration of social service programs. In addition, county involvement includes travelers' aid programs, an indigent health program now being established, and information referral assistance. A senior citizens assistance program is funded by the county, providing transportation, nutrition, social security assistance, and health programs to the senior citizens in the area (Sotak, personal communication 1979).

Discussions with individuals responsible for providing these services indicate that the projected baseline population growth would not create any severe problems in providing services. Members of state agencies also indicated that the state has a pool of personnel resources available which can be used to supplement local personnel to meet immediate needs, and that additional personnel can be assigned to the area if justified by increased demand (Love, personal communication 1979).

Community Facilities

Tonopah has several community facilities that are used by the public and provide a focal point for community interaction. The Tonopah Convention Center, in the center of town, houses the local Chamber of Commerce Offices and serves as a visitor center and a meeting place for small and large groups. It is funded through a local room tax and from fees charged to facility users (Alexander, personal communication 1979).

The Tonopah Public Library is a member of the county library system. It contains 8,000 volumes and has access to additional resources in Las Vegas, such as a bookmobile that serves the entire county, audio-visual materials, and other library materials. One librarian is responsible for operation of the library which is open only from 2:00 to 5:00 P.M. weekdays (Perchetti, personal communication 1979).

The U.S. Post Office in Tonopah provides both office boxes and window services; there is no home delivery. The postmaster expressed an urgent need for about 500 post office boxes and three full-time employees. The building appears to have some capacity for needed additions (Vokits, personal communication 1979).

The baseline population growth projected through the year 2001 would increase the demands on these facilities. The post office facility, already strained from a backlog of unmet demands for service, will be adversely affected by further growth if new resources are not provided.

CHAPTER 3

ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

Chapter 3 presents discussions of the environmental consequences which would result from implementation of the Proposed Action and alternatives. As directed in Section 1502.16 of the National Environmental Policy Act (NEPA) regulations for Environmental Impact Statements (EIS), the chapter presents the scientific and analytic basis for the comparison of alternatives included in Chapter 1.

In keeping with the directives of Section 1502.2(b) of the NEPA regulations, the discussions of environmental consequences focus on impacts which are considered significant; criteria used to establish significance are stated in the analyses. The general approach followed throughout the chapter is to describe briefly the full range of impacts which would occur and then to provide detailed discussion of those which are considered significant. Exceptions were made to this general rule, however, when a question of potentially significant impact was raised as an issue in the scoping process, in contacts with interested agencies or persons, in the impact analysis process, or in a preliminary review. In these instances the potential impact or issue is addressed even if the end conclusion is that no significant consequences would occur.

As with material in Chapter 2, the discussions presented were based on a series of technical reports developed by Environmental Research & Technology, Inc. (ERT) as background material for the EIS. In general the technical reports present more detailed, technical discussions of the material contained in this chapter. The reports also address potential impacts which were considered, determined not to be of concern, and not included in the EIS, as well as insignificant impacts which are only briefly discussed. Frequent references to the reports occur throughout the chapter. A list of the technical reports and topics included in each was presented in Table 2-1.

ASSUMPTIONS AND ANALYSIS GUIDELINES

Certain assumptions on various environmental elements have been made in the analysis of the environmental consequences of implementing the Proposed Action and alternatives. The following general assumptions apply to all analyses herein; specific assumptions for individual resources are included in respective sections.

1. It was assumed that the Proposed Action and alternatives would be implemented as described in Chapter 1. Design specifications, facilities, emission rates, employment levels, and similar parameters would be as described. Standard operating procedures at the mine/mill complex and committed mitigation measures for the 230kv transmission line would be enforced and adequately implemented. A detailed revegetation plan would be developed and implemented at the mine/mill site. The revegetation plan would be consistent with the guidelines presented in Appendix A.
2. It was assumed that permanent area losses at the mine/mill complex would be limited to the 456-acre mine pit. All other areas (2,484 acres) would eventually be abandoned and subjected to reclamation efforts. For comparison purposes, it was assumed that all acreage for the mine/mill complex would be removed from use in the first year of the project and would not be subject to rehabilitation efforts until after mine/mill closure.
3. Assumed actual disturbance within the transmission line corridors would be limited to an 8-foot wide access trail running the length of the line; an 800 square-foot area at each tower site; 3 acres for a materials storage yard on ACC property; and 4 acres for the switching station. Although no permanent access road would be constructed, the future extent of use of the access trail is unknown and was therefore considered a permanent disturbance. Other permanent disturbances associated with the transmission line include 4 acres for the switching station. Disturbances for tower construction and for the materials storage yard were assumed to be temporary.

4. Impacts of potential off-road vehicle (ORV) use of the access trail were not analyzed. These potential impacts will be analyzed in an EIS on ORV use to be prepared during 1980 by the BLM Battle Mountain District Office.
5. It was assumed that soil stabilization and revegetation of disturbed sites, as compared to adjacent undisturbed sites, would require approximately 5 years if irrigated and approximately 10 years without irrigation.
6. Short- and long-term impacts were defined as follows. Short-term includes the 20-year project life plus an assumed 10-year rehabilitation period, or a total of 30 years. Long-term impacts are those which would extend beyond the 30-year time period or would not occur until after that period.
7. Where information was unavailable on an environmental component or project design feature, or where there was uncertainty regarding the likelihood of an impact or event occurring, a worst-case analysis was assumed to be appropriate. Following the worst-case analysis, the probability of the worst-case occurrence was estimated to the degree possible.
8. Impacts and effects are used synonymously in the analyses and are defined as changes in the current or predicted future "status-quo". Impacts may be beneficial or adverse.

EFFECTS OF IMPLEMENTING THE PROPOSED ACTION

This section presents analyses of the beneficial and adverse effects of implementing the Proposed Action. Impacts, committed and potential mitigation measures, and unavoidable adverse effects are discussed in detail separately for each environmental component significantly affected by the proposal. Several mitigation measures for the transmission line and standard operating procedures for the mine/mill complex were incorporated into the description of the Proposed Action (Chapter 1) and were considered to have been in effect in the analyses.

Following the discussion of individual components, remaining sections focus on (1) the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity, (2) the irreversible and irretrievable commitment of resources associated with the Proposed Action, and (3) energy requirements.

Effects on three environmental elements discussed in Chapter 2 are not addressed in this section because they would not be significantly affected by the Proposed Action and no issues concerning the components were identified. These are:

- Climate (ERT Air Quality Technical Report 1980)
- Wilderness (ERT Socioeconomic Technical Report 1980)
- Agriculture (ERT Socioeconomic Technical Report 1980)

Air Quality

Specific Assumptions and Analysis Guidelines

Particulate concentrations in the atmosphere are regulated by both state and Federal agencies. In both cases, the concern is for total suspended particulates (TSP) which are measured by high-volume air samplers. Both the State of Nevada and the U.S. Environmental Protection Agency (EPA) require that an application for permission to construct be approved prior to commencing construction. Applications to both of these agencies have been approved for the proposed mine/mill complex, and these documents form the basis for the assessment of air quality impacts (ERT 1978; ERT 1979). The applications were prepared in late 1978 and early 1979. Since that time, changes in the project have occurred and the assessment of air quality impacts has been revised.

The governing criteria of significance on which these permits are approved or denied are compliance of anticipated ground-level concentrations with both National Ambient air Quality Standards (NAAQS) and Prevention of Significant Deterioration (PSD) increments. For TSP these criteria are shown in Table 3-1. For analysis purposes, the TSP annual geometric mean will be the criterion of significance used to determine significant impacts. The NAAQS are total concentrations, including background, while the PSD increments are just the increases over existing concentrations. Predictions of ground-level concentrations were made by an air quality model. The air quality model (see Appendix E) uses emission rate estimates and meteorological values as inputs and utilizes mathematical formulations to calculate the concentrations.

In the air quality permit applications prepared previously, emission rate estimates were divided into two categories in keeping with both state and Federal procedures. One group of sources, called fugitive dust sources, consisted of the particulates produced by the mining operations, the traffic on unpaved

roads, and wind erosion from the exposed areas.

The fugitive dust sources were not modeled because they were essentially determined to be insignificant by EPA and the State of Nevada when approval for permission to construct was given as discussed above. However, as a basis for comparison, the annual fugitive dust emissions for the mine/mill complex would be equal to fugitive dust emissions produced by 20 family size pick-up trucks making one round trip per day on a 70-mile Nevada unpaved road. The impacts associated with fugitive dust are not considered significant.

The other group of sources, called industrial process emissions, included emissions from the molybdenum concentrator, the molybdenum dryer, and the coarse ore stockpile. The emission sources for industrial process emissions were modeled to determine emission concentrations.

The meteorological values required by the model are wind speed and wind direction data, as well as a characterization of atmospheric stability and vertical mixing depth. Since it was necessary to analyze for only two averaging times (annual and 24-hour maximum), separate analyses were carried out for each case. Annual averages were analyzed using long-term data taken at the Tonopah airport located in the Ralston Valley, south and east of the mine/mill site. Maximum 24-hour concentrations were analyzed by establishing a number of "worst-case" scenarios and calculating the ground-level concentrations for each case. The cases analyzed included the possibility of an 8-hour persistence from any direction. For each case, stabilities and mixing depths were chosen to reasonably represent worst cases.

Impacts

Estimates were made of the particulate emissions which would result from the mine/mill complex during full-scale operations. The particulate emissions from the operation of the mine/mill complex are direct impacts. Sources of these particulate emissions include removal and hauling of overburden and ore, road maintenance, wind erosion, vehicular exhaust, and ore processing in the mill. Total emissions were estimated to be 1600.5 tons per year, or a maximum for a 24-hour period of 417.0 pounds per hour. The fugitive dust emissions from the mine/mill complex were not considered significant for the reasons described under specific assumptions and analysis guidelines (ERT Air Quality Technical Report 1980).

As noted previously, only industrial process emissions must be considered in the air quality modeling for NAAQS and PSD compliance. From these sources, emissions were calculated as 15.1 tons per year, and the maximum emission rate for a 24-hour period was calculated as 4.1 pounds per hour (ERT Air Quality Technical Report 1980). Annual average TSP concentrations resulting from industrial process sources were calculated by the model as a highest value of 1.4 micrograms per cubic meter ($\mu g/m^3$). This is well below the maximum allowable PSD increment of 19 $\mu g/m^3$ for annual average concentrations (Figure 3-1). Additionally, when added to the annual geometric mean TSP concentration of 16.1 $\mu g/m^3$ currently measured at the site, the maximum impact is still well below the NAAQS of 60 $\mu g/m^3$ (ERT Air Quality Technical Report 1980).

Maximum 24-hour concentrations of TSP were predicted to occur for both south-southwesterly and north-northwesterly wind directions and resulted in a concentration of 6.5 $\mu g/m^3$. This value is well below the 24-hour PSD increment of 37 $\mu g/m^3$. It is not correct to add this prediction to the highest measured 24-hour concentrations to determine compliance with the NAAQS because high measured TSP concentrations result during high wind speeds, while the maximum impact predictions are for low wind speeds. For this reason, the mine/mill complex would not result in concentrations which exceed the 24-hour NAAQS (ERT Air Quality Technical Report 1980).

There are no detectable air quality effects from the 230kv transmission line during operations. Transmission lines cause ionization of the surrounding air (corona effect) and result in the formation of certain pollutants such as ozone and nitrogen oxides. The level of emissions from powerlines is considered insignificant. There would be some fugitive dust concentrations resulting from the construction of the line; however, the direct impacts are expected to be quite small, short in duration, and are considered insignificant (ERT Air Quality Technical Report 1980).

Unavoidable Adverse Impacts

Construction and operation of the mine/mill complex would result in a direct impact of controlled particulate emissions of approximately 1,600.5 tons per year. This is considered an insignificant impact because the estimated annual average and maximum 24-hour TSP concentration associated with the industrial process were modeled and would be well below the PSD increment and the NAAQS. Based on the accepted PSD and NAAQS criteria, it is anticipated that the Proposed Action would not significantly affect air quality.

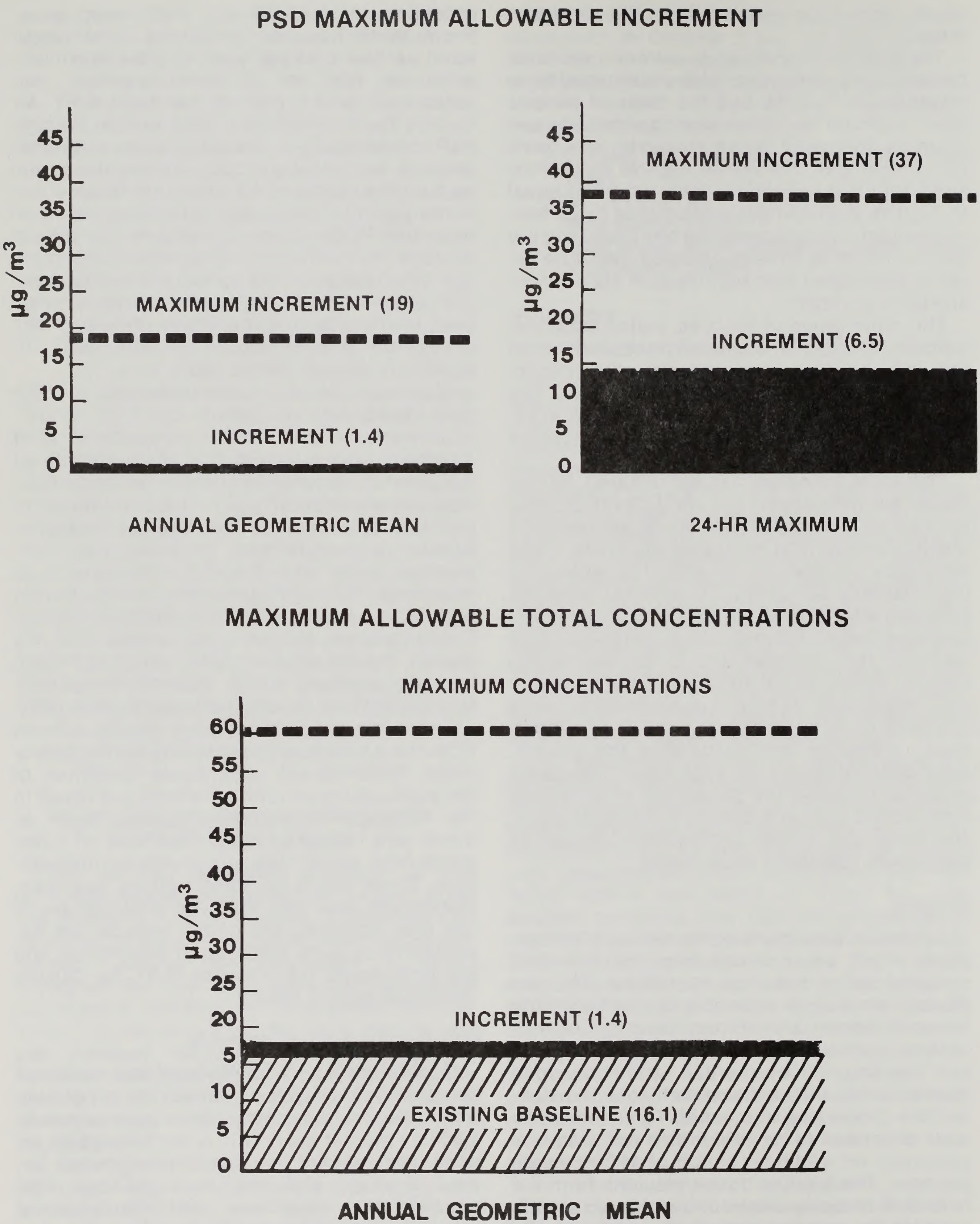


Figure 3-1. Comparison of Predicted Particulate Emissions and Concentration with Air Quality Standards (Proposed Action)

TABLE 3-1

STATE OF NEVADA AND U.S. EPA RULES GOVERNING AIR QUALITY CONCENTRATIONS FOR TOTAL SUSPENDED PARTICULATES

	NAAQS Maximum Allowable Total Concentration ($\mu g/m^3$)		PSD Maximum Allowable Increment Concentration ($\mu g/m^3$)
	Primary[1]	Secondary[2]	
State of Nevada			
Annual Geometric Mean	60	--	19
24-hour Maximum	150	--	37
U.S. EPA	(NAAQS)		(PSD)
Annual Geometric Mean	75	60	19
24-hour Maximum[3]	260	150	37

[1]Requisite to protect human health

[2]Requisite to protect the public welfare from any known or anticipated adverse effects

[3]Not to be exceeded more than once per year

Source: ERT Air Quality Technical Report 1980

Geologic Setting

Impacts

In the 456 acres disturbed by the mine pit, approximately 769 million metric tons of material would be removed over the project life. Removal of this material would not directly affect the geologic setting of adjacent areas. Indirect effects of relocation of this material are discussed in the Soils and Visual Resources sections of this chapter.

As described in Chapter 2, the mine/mill site is located in a region of high seismic risk. This fact necessitated special design considerations for the tailings embankment. Following paragraphs discuss potential earthquake effects on the tailings embankment.

In order to assess the risk of earthquake damage to structures at the mine/mill site, estimates were developed for the effective peak horizontal ground acceleration or EPA (see Glossary) which would result from seismic events in the area. Table 3-2 shows the estimated EPA which would have resulted from the five major seismic events (magnitude >7) mentioned in Chapter 2 (Table 2-3). Also shown are projected EPAs which would result from earthquakes along faults considered active in the region. It is estimated that seismic events along these faults could produce EPAs of as much as 0.26g. This estimate is based on a consolidated rock surface; the estimated EPA for an alluvial site would be somewhat lower (Computer Sciences Corp. 1977).

As noted in Chapter 1, the proposed tailings embankment would be designed to withstand on-site earthquake effects which have a 90 percent likelihood of not being exceeded in a 50-year period. This design value which corresponds to an EPA of 0.20g, was selected on the basis of a 475-year peak dynamic acceleration contour map derived by Algermissen and Perkins (Bechtel 1980). According to this map, an EPA of 0.20g would have a 90 percent probability of *not* being exceeded in a 50-year period, or a 96 percent probability of not being exceeded over the project life.

Thus, as Table 3-2 shows, seismic events resulting in greater than the design value of 0.20g EPA at the site are possible. The probability of occurrence of these hypothetical events is unknown, but would be less than 4 percent over the project life. Thus, the probability of occurrence of on-site EPAs greater than the design value is taken to be less than or equal to 4 percent. Should such an event occur, there is a possibility that the tailings embankment could fail, releasing materials stored behind it. However, embankment failure would be possible only if the pond were filled to capacity, or after a 100-year flood. Thus, in order for embankment failure to occur, a major earthquake would have to occur just after the occurrence of a 100-year flood. Since the chances of both events occurring during the entire 20-year project life are estimated at 8 chances in 1,000 (probability of major earthquake in 20 years is 0.04; probability of 100-year flood in 20 years is

TABLE 3-2

ESTIMATED EARTHQUAKE EFFECTS AT THE MINE/MILL SITE FOR THE NEVADA MOLY PROJECT

Earthquake	Date	Distance from Site (miles)	Magnitude	Estimated EPA[1] at Site (g)[2]
Owens Valley	Mar. 26, 1878	75	8.0	0.08
Pleasant Valley	Oct. 7, 1915	160	7.6	0.01
Cedar Mountains	Dec. 20, 1932	49	7.3	0.08
Fairview Peak	Dec. 16, 1954	106	7.1	0.02
Dixie Valley	Dec. 16, 1954	98	6.8	0.02
Fault A[3] western side of Big Smoky Valley		22	7.5	0.26
Fault B[3] southern end of Tonopah Flat		16	6.5	0.22

[1]Effective peak horizontal ground acceleration (EPA) at site estimated from attenuation curves published by Seed et al. (Seed, H. B., R. Murarka, J. Lysmer, I. M. Idriss. 1973. Relations between maximum acceleration, maximum velocity, distance from source, and local site conditions for moderately strong earthquakes. Report No. 75-17, Earthquake Engineering Research Center, University of California, Berkeley) and Schnabel and Seed (Schnabel, P. J. and H. B. Seed. 1973. Acceleration in rock for earthquakes in the western United States. Bulletin of the Seismological Society of America. Volume 63, no. 2).

[2]Gravitational acceleration (g) equals approximately 32 feet/sec^2.

[3]Hypothetical earthquakes on faults near the site which have not generated major historical earthquakes but, based upon geological evidence, may be active.

Source: Sergent, Hauskins and Beckwith Consulting Soil and Foundation Engineers. 1978. Final Report, Phase I Hall Molybdenum Project. The Anaconda Company, Nye County, Nevada.

0.2), the chances of both occurring simultaneously are extremely small. Accordingly, no worst-case analysis was performed.

Topography

Impacts

By design, the operation of the mine/mill complex would alter the existing topography of the site. Most of the 769 million metric tons of material removed from the open pit mine would ultimately (1) be deposited in waste disposal areas adjacent to the pit, (2) be used to build the tailings embankment, or (3) would be deposited as tailings behind the embankment. Figure 3-2 compares, through computer simulation techniques, the topography of the mine/mill site before and after implementation of the Proposed Action. As shown, the pit area, now part of the foothills of the San Antonio Mountains would be excavated; areas west of the mountains would be raised and would become level areas above the alluvial valley floor.

The topographic alteration shown in Figure 3-2 would be a direct, significant impact of the Proposed Action. The impact is considered significant because the topographic alteration would be visible from as far as 25 miles to the west and is the primary factor in the conclusion that the mine/mill complex would result in significant impacts to visual resources (see Visual Resources section of this chapter).

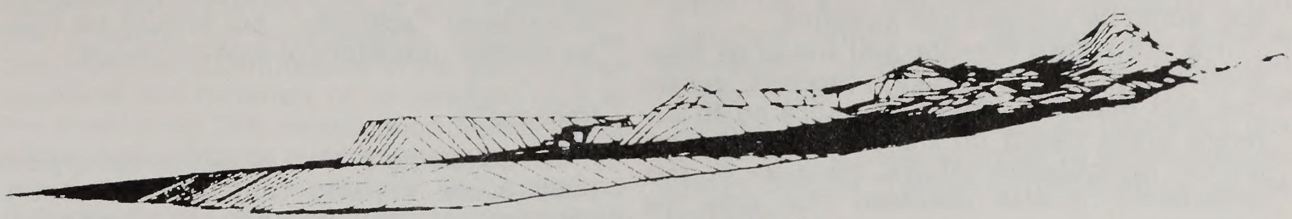
Unavoidable Adverse Impacts

By design, the operation of the open pit mine would cause significant changes in topography. If the Proposed Action is implemented these impacts are unavoidable.

Soils

Specific Assumptions and Analysis Guidelines

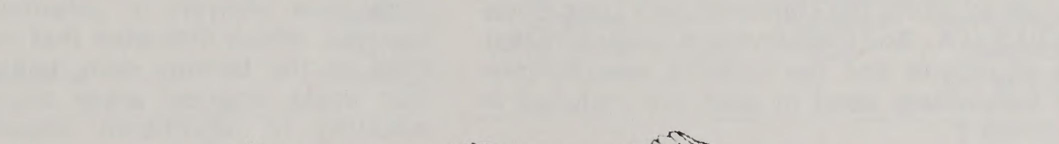
In order to assess potential changes in erosion losses at the mine/mill site, assumptions were made regarding revegetation procedures. It is known that ACC will strip 6 to 12 inches of topsoil from the area to be occupied by the tailings pond and embankment. The total area subject to soil stripping operations would be



2001 As viewed from Southwest at 3 miles

1980 As viewed from Southwest at 3 miles

2001 As viewed from West at 3 miles



1980 As viewed from West at 3 miles

Figure 3-2. Computer Simulation of Topography Changes at the Mine/Mill Site.

1,085 acres. It was assumed that 12 inches of soil would be stripped and salvaged.

It is not known how the soil would be reapplied during the revegetation process, except that soil materials would be allocated to different areas based on the results of experimental revegetation efforts. Because of this uncertainty, it was assumed that only the following areas would be resoiled during revegetation efforts: tailings embankment; tailings pond; and waste rock disposal areas (total of 4). The assumption is based on ACC's plan that the mine pit would not be revegetated and the EIS team's belief that other disturbed areas (e.g., roads, parking areas, mill and office facility locations) could be revegetated without application of soil materials.

Thus, the scenario used in analyzing impacts to the soil resource assumes that soil materials would be salvaged as noted above; evenly mixed and stored in the soils stockpile during mine/mill operation; and applied equally to the waste disposal areas, tailings pond, and tailings embankment during revegetation. Within the scenario, it was further assumed that chemical or other stabilization treatments would be applied to the soil in the stockpile to limit wind erosion losses and that a protective mulch would be applied to the soils after reapplication. Both of these measures are included as possible practices in the revegetation guidelines presented in Appendix A.

Using this scenario, soil erosion losses were calculated for both wind and water. Losses were calculated as tons of soil lost per acre per year and were calculated for several assumed time periods during revegetation: predisturbance; immediately after soil application; after mulch application; and after vegetative cover develops to one-half of its pre-disturbance condition. Wind erosion losses were calculated using an equation developed by Woodruff and Siddoway (1965). Water erosion losses were calculated using the Universal Soil Loss Equation (U.S.D.A., Soil Conservation Service 1976a). The equations and the specific assumptions and parameters used in each are included in Appendix F.

It should be noted that the wind erosion equation was developed as a tool for selecting applicable conservation practices for croplands in the midwest and Great Plains and, as such, has certain limitations as a predictive device. Specifically in Nevada, representatives of the Soil Conservation Service feel that erosion losses predicted using the equation do not accurately reflect actual conditions. No correction factors exist for adjusting the results and the magnitude of the error is unknown. Thus, values predicted for wind erosion should not be considered "absolute", but should be viewed as relative indicators of erosion losses.

Impacts

The following project activities could potentially cause impacts to the soils resource: covering of soil by project components; disturbance of the soil surface; and displacement of soils materials during soil salvage operations. These activities can result in impacts on soils which include direct loss of soil material and associated productive potential; alteration of soil chemical and physical properties; and indirect loss of soil material due to increased exposure to erosive forces. The significance of these impacts is defined in relation to (1) the magnitude of change expected in potential soil productivity, (2) the magnitude of expected indirect effects on the vegetation resources, or (3) the magnitude of indirect effects on the visual landscape.

Consideration of these factors in the ERT Soils Technical Report (1980) led to the conclusion that construction of the proposed 230kv transmission line would not cause significant effects on soil resources. Although soil disturbance would occur to some extent along the access trail, at tower construction sites, and at the materials storage yard, a determination of no significant impact was based on the relatively small area of disturbance (a total of 98 acres over 86 linear miles) and the inclusion of enforceable revegetation and erosion procedures as committed mitigation measures within the description of the Proposed Action (Chapter 1).

Consideration of the same factors at the mine/mill site, however, lead to the conclusion that significant impacts to soils resources could occur, based on possible indirect reductions in revegetation potential due to direct burial of soils. The conclusion is based on a worst-case analysis of potential revegetation success, which indicated that revegetation efforts on the tailings dam, tailings pond, and four waste disposal areas could fail, in turn resulting in significant impacts to visual resources.

Since there are uncertainties regarding eventual reclamation plans, particularly with regard to the potential water-holding capacity of tailings and waste disposal areas to be revegetated, a worst-case premise was necessary. If it is assumed that the tailings and waste disposal areas would have low water-holding capacity, the availability of soil materials for resoiling becomes critical. The depth to which soil can be reapplied, and the soil's water-holding

capacity are important factors which influence the potential for revegetation success. As described below, limitations in the quantity and quality of soil materials to be salvaged lead to the conclusion that revegetation failure could occur. Assuming, as a worst case, that failure would occur, the direct loss of soil materials through burial by waste rock and tailings disposal operations would be a direct significant impact.

As specified in Chapter 1, ACC intends to salvage 6 to 12 inches of soil materials from the area of the tailings pond and dike (1,085 acres). If 12 inches were salvaged, approximately 5,251,400 cubic yards of soil would be available for future reapplication to disturbed sites. This would be enough soil to cover the tailings pond and dam and the four waste rock disposal areas to a depth of approximately 6 inches. It is possible that these materials would in themselves have revegetation potential or that experimental test results would lead to development of techniques to allow a successful revegetation program; however, this is currently unknown.

Assuming that tailings and waste disposal areas would be poor quality plant growth materials, only 6 inches of soil material would be available. Cook et al. (1974) state: "... 18 inch depth (of soil) is necessary for storage of water to field capacity that is received during fall and winter. Such moisture is necessary for plants to survive the dry summer months that frequently prevail". Based on this general premise, and given the arid environment, insufficient soil materials would be salvaged to achieve successful revegetation. The Stumble soil series which comprises the majority of the material to be salvaged has an inherently low water-holding capacity (refer to series description in Chapter 2) which further compounds the problem.

The high erosion hazard associated with the Stumble soils also raises questions about the potential for revegetation success. Abandoning the worst-case premise and assuming that 6 inches of soil would be sufficient, questions still arise as to the potential for wind and water erosion losses to be severe enough to jeopardize revegetation success. Wind and water erosion losses were calculated as described in the assumptions and Appendix F to assess this possibility.

Results of the analysis for water erosion are presented in Table 3-3. Project-induced water erosion would occur only on the slopes of the tailings dam and two of the four waste disposal areas. Exposed slopes (slopes on which no soil conservation measures were used) would be subject to water erosion losses of between 32 and 60 tons per acre per year. These losses would be great enough to jeopardize seedling establishment. However, the analyses show that application of mulch would reduce the losses to between less than 1 to 6 tons per acre per year. Although the effectiveness of the straw mulch (assumed in the example) as an erosion inhibitor would gradually decrease over

TABLE 3-3

WATER EROSION RATES ASSOCIATED WITH SEVERAL REVEGETATION SCENARIOS FOR THE MINE/MILL COMPLEX

	Erosion rates (tons/acre/year)[1]			
Project Component	Baseline (Current conditions)[2]	Exposed Soil (No conservation practices)	Mulched Soil	Revegetation (One-half completed)[3]
Slopes of Waste Disposal Area 3 (NW of pit)	0.7	38.6	0.9	14.1
Slopes of Waste Disposal Area 4 (SW of pit)	0.7	31.8	0.7	11.6
Slopes of Tailings Dam	0.7	60.2	6.9	22.1

[1]Reference "Specific Assumptions and Analysis Guidelines" and Appendix F for methodology and assumptions utilized.

[2]Current water erosion is very low in the alluvial plain because of nearly level terrain. Revegetated areas are assumed to be 3:1 slopes. Baseline conditions are for Stumble series.

[3]Assumes vegetation canopy, ground cover, and herbage production are one-half of uncut conditions.

Source: ERT EIS Team.

time, it is reasonable to assume that application of other water-erosion control measures (as mentioned in Appendix A) would limit losses to levels which would not inhibit revegetation success.

Results of the wind erosion analysis are presented in Table 3-4. The predicted losses in the table are considered to be higher than would actually occur; it is doubtful that current losses are actually 190 tons per acre per year. However, it is believed that the relationships between the values are valid. Although erosion losses would not be greatly different from naturally occurring (baseline) conditions, the losses would be high and would be of concern because of the limited amount of soil material available for reapplication.

The fact that there is less soil available to "blow away" emphasizes the need to reduce wind erosion losses below naturally occurring levels, at least during the initial stages of revegetation. The example use of mulch presented in the table indicates that conservation practices would be effective in accomplishing this, and as indicated in the revegetation guidelines (Appendix A), would be a necessary part of the revegetation program.

Mitigation Measures

No mitigation measures to reduce or prevent the significant impacts of soil burial associated with the worst-case analysis have been committed to by ACC. Salvage of greater amounts of soil material or higher quality soil materials are potential mitigation measures which could be employed to increase the potential for revegetation success. These are described in Appendix J.

Unavoidable Adverse Impacts

Unknowns regarding the potential quality of tailings and waste rock disposal areas as plant growth media indicate a need for a worst-case analysis. Assuming that these areas would not provide suitable media, it was concluded that insufficient soil material would be available for use in revegetation. Poor water-holding capacity and high erodibility would limit revegetation potential; this led to a conclusion that revegetation failure would occur. If tailings and waste disposal areas were not revegetated, significant impacts to visual resources would occur. Accordingly, the loss of soil materials through burial would be a direct, significant impact.

The worst-case premise may not occur, however, as (1) waste rock and tailings disposal areas may provide suitable plant growth materials, (2) ACC plans to conduct experimental revegetation efforts during the project, and (3) ACC would develop and implement a detailed site-specific revegetation plan. It is possible that revegetation techniques developed would lead to successful revegetation. The probability of this occurring is unknown, but the most probable case is that some disturbed areas would be successfully revegetated, while failure would occur on others.

Water Resources

Specific Assumptions and Analysis Guidelines

No specific assumptions were made for the analysis of impacts to surface water resources. For groundwater resources, it was assumed that:

- Water quality of the tailings liquid would be as projected from the operation of the Nevada Moly Pilot Plant.
- Groundwater pumping at the beginning of the project would total approximately 6,200 gallons per minute (gpm) from five wells. Groundwater demand over most of the project life would approximate 3,000 gpm.
- Approximately 3,450 acre-feet of tailings material would be discharged each year. Approximately 16.2 acre-feet per day of tailings liquid would be discharged to the tailings pond.
- Between 20 and 40 acres of the tailings pond would be exposed to standing water at any given time.

Impacts

Impacts to water resources could potentially be caused by the following project activities: reduction of permeable surfaces at the mine/mill complex; changes in surface runoff patterns at the mine/mill complex; groundwater pumping for the mill; seepage of tailings liquid from the tailings pond; and passage of construction vehicles through perennial streams during transmission line construction. Effects of each of these activities were analyzed in two ERT (1980) technical reports (Surface Water; Groundwater and Geology) and it was concluded that no significant impacts to water resources would occur as a result of the Proposed Action. The conclusions were based on the assumption that significant impacts are those which result in (1) changes in water quality which exceed water quality criteria for drinking water or (2) changes in water quantity which affect current or future water uses.

For the proposed 230kv transmission line, the conclusion of no significant impact was

TABLE 3-4

WIND EROSION RATES ASSOCIATED WITH SEVERAL REVEGETATION SCENARIOS FOR THE MINE/MILL COMPLEX

	Erosion Rates (tons/acre/year)[1]			
Project Component	Baseline (Current conditions)[2]	Exposed Soil (No conservation practices)	Mulched Soil	Revegetation (One-half completed)[3]
Materials Storage Yard	190	195	23	192
Tailings Dam and Pond	190	195	25	194
Waste Disposal Area 1 (S of pit)	190	193	23	190
Waste Disposal Area 2 (N of pit)	190	195	26	192
Waste Disposal Area 3 (NW of pit)	190	195	26	192
Waste Disposal Area 4 (SW of pit)	190	195	26	192

[1]As noted in the text, Nevada soil scientists do not feel that the wind erosion equation gives accurate predictions of actual loss for Nevada soils. The rates given are believed to be too high. The relationships between numbers are believed to be valid. Reference "Specific Assumption and Analysis Guidelines" and Appendix F for assumptions and methodology utilized.

[2]Baseline conditions are for Stumble soil series.

[3]Assumes vegetation canopy, ground cover, and herbage production are one-half of existing conditions.

Source: ERT EIS Team.

based on the fact that only one perennial stream, Moore's Creek, would be crossed by construction vehicles. Crossings would occur during low-flow periods (winter), would be kept to a minimum, and would be adequately regulated by the enforceable mitigation measures presented in Chapter 1. Details of the analysis are contained in the ERT Surface Water Technical Report (1980).

The conclusion of no significant impact on surface water resources at the mine/mill site was based on the fact that surface water is scarce at the site; surface water discharge occurs only for short periods of time during high intensity thunderstorms or as runoff from melting snow. As discussed in the ERT Surface Water Technical Report (1980), expected changes in runoff patterns would not lead to effects on water quantity or water quality in streams or other surface waters in the project area.

Detailed analyses of potential effects on groundwater resources are contained in the ERT Groundwater and Geology Technical Report (1980). Although the ultimate conclusion was that no significant impacts would occur, there is some uncertainty associated with the conclusion so the analyses are summarized below.

The first analysis relates to the potential contamination of groundwater due to seepage from the tailings pond. As described in Chapter 1, mill tailings would be discharged to the tailings containment area at a rate of approximately 3,450 acre-feet per year. The tailings slurry would contain rock particles, process water, and reagents. Estimation of the potential effects of the proposed tailings containment area on the quality of the underlying groundwater system requires consideration of the following factors, discussed in detail in the ERT Groundwater and Geology Technical Report (1980):

- chemical quality of the tailings liquid;
- seepage rates from the containment area;
- hydrologic and geochemical processes in the unsaturated zone; and
- dilution in the saturated zone.

Projected chemical quality of the tailings liquid is shown in Table 3-5. These data are based on chemical analysis of a sample of tailings solution from the Nevada Moly Pilot Plant. At the time of sampling, tailings liquids had been recycled for a period of 4.5 days (Anaconda Company 1979). Of those dissolved constituents analyzed, only sulfate, fluoride, manganese, and total dissolved solids concentrations exceed appropriate drinking water standards (see Table 3-5). Additionally, the tailings liquid would contain approximately 25 parts per million (ppm) of methylisobutyl carbinol (MIBC), a froth flotation reagent used in the concentration process. This concentration

TABLE 3-5

PROJECTED CHEMICAL QUALITY OF TAILINGS LIQUID AT THE NEVADA MOLY PROJECT

Parameter	Estimated Concentration (mg/1)	Drinking Water Standards (mg/1)
Arsenic (As)	.005	.05[1]
Cadmium (Cd)	.001	.01[1]
Chromium (Cr)	.005	.05[1]
Lead (Pb)	.01	.05[1]
Mercury (Hg)	.0005	.002[1]
Nitrate (No_3)	[3]	10.[1]
Silver (Ag)	.001	.05[1]
Fluoride (F)	10.1	1.8[1]
Chloride (Cl)	29.0	250.[2]
Copper (Cu)	.026	1.[2]
Iron (Fe)	.03	.3[2]
Manganese (Mn)	.37	.05[2]
Sulfate (SO_4)	521.0	250.[2]
Zinc (Zn)	.094	5.[2]
Total Dissolved Solids	1059.0	500.[2]
Molybdenum (Mo)	.04	---
pH	8.2 units	

[1]40 CFR 1412 - National Interim Primary Drinking Water Regulations
[2]40 CFR 143 - Proposed National Drinking Water Regulations
[3]Data unavailable
Source: Anaconda Copper Company

is well below the known toxic range (greater than 1,000 ppm) for MIBC (Calspan Corporation 1975).

Approximately 16.2 acre-feet per day of tailings liquid would be discharged to the tailings containment area. Over the initial two to three years of operation, large quantities of tailings liquid would be lost to infiltration. However, it is probable that a large portion of this initial seepage would be held as a pellicular film in the thick unsaturated zone beneath the tailings pond, and thus would not significantly affect the underlying groundwater system.

Continual tailings disposal would create a low permeability slimes zone at the base of the tailings pond. On the basis of studies conducted for a similar tailings pond (W. A. Wahler and Associates 1978), it is estimated that seepage losses over the majority of the project life would be approximately 10 acre-feet per year per acre. assuming 10 acre-feet per year per acre of seepage over an average surface area of 40 acres, net tailings pond seepage over most of the project life would be approximately 400 acre-feet per year. An alternate mass balance approach to estimation of seepage losses (discussed in ERT Groundwater and Geology Technical Report 1980) yields a predicted maximum seepage loss of 590 acre-feet per year.

Physical and chemical processes in the unsaturated zone may significantly reduce the concentration of dissolved solids in the tailings liquid. Moreover, the large quantities of groundwater flowing beneath the site may effectively dilute tailings liquid reaching the water table. For example, approximately 10 percent (800 acre-feet per year) of the existing groundwater underflow (with an existing dissolved sulfate concentration of approximately 50 mg/l) would be required to mix with 590 acre-feet per year of tailings liquid (521 mg/l sulfate) to produce a downgradient sulfate concentration within drinking water standards.

As described above, available data support the conclusion that seepage from the proposed tailings pond would not result in significant impacts to groundwater quality. However, uncertainties are associated with the predicted tailings liquid quality and tailings pond seepage rates. Additionally, data regarding the water-holding capacity and adsorption capacity of on-site alluvial deposits are incomplete or lacking. Thus, monitoring of groundwater quality downgradient of the proposed tailings pond would be required to accurately determine the effects

of tailings pond operation and has been included as part of the Proposed Action.

ACC has indicated that a monitoring well would be established downgradient of the tailings pond and that the well would be regularly sampled and tested for key contaminants present in the tailings liquid. In the event of detected adverse effects on groundwater quality, corrective measures, such as dessication or manipulation of the slimes zone to reduce seepage, would be initiated.

The second analysis related to potential effects of groundwater pumping during the project life. A specific question was asked by the wildlife discipline specialist regarding possible effects on Liberty Spring, an important area of wildlife habitat southeast of the mine site. Recharge to the spring is derived from infiltrating precipitation in the San Antonio Mountains. Spring discharge infiltrates the alluvial apron to the west. The Liberty Spring and its recharge area are located well above the alluvial valley aquifer system. Thus, project-related groundwater withdrawal from the alluvial aquifer would not affect discharge from the spring.

Potential effects on other groundwater users were also analyzed. During the initial stages of project operation, three wells would withdraw approximately 6,200 gallons per minute (gpm) of water from the Big Smoky Valley alluvial aquifer. Continual disposal of tailings would reduce infiltration losses in the tailings pond and permit water recycling to the mill. Groundwater demand over most of the project life is estimated to be approximately 3,000 gpm. Continuous pumping of the proposed supply wells would create cones of depression in the underlying water table. Table 3-6 summarizes the drawdown effects of various operational pumping conditions. This table shows the effects of a single pumping well. Drawdown effects of greater than one well would be additive where the respective cones of depression intersect. That is, two wells located 2,000 feet apart, each operating under conditions shown in Example F (Table 3-6), would result in a maximum drawdown of 30 feet at a point midway between the pumping wells (assuming homogeneous hydrogeologic conditions). Perceptible drawdown effects associated with five wells pumping a combined total of 6,200 gpm for an estimated maximum 3-year period would be confined to a radius of less than 3 miles. No direct effect on other water users in the region would be expected.

The predicted average groundwater withdrawal of 3,000 gpm (4,840 acre-feet per year) represents approximately 39 percent of the natural groundwater flow beneath the ACC property (12,500 acre-feet per year). Although some of this withdrawn groundwater would be returned to the groundwater system via tailings seepage (approximately 25 percent under steady-state operating conditions), most of this quantity would not be returned. Accounting for return via seepage, the average groundwater demand would result in an approximate 34 percent reduction in natural groundwater flow beneath the ACC property.

The concept of "perennial yield" may be applied to the assessment of the effects of this reduction in groundwater flow. According to Rush and Schroer (1970) the perennial yield of a valley-fill reservoir is defined as the maximum amount of groundwater pumping that can be sustained over a long period of time without bringing about undesireable effects. For the groundwater system affected by the mine/mill operation, this is estimated as 6,000 acre-feet per year (Rush and Schroer 1970).

Accounting for return via seepage, the net loss to the groundwater system associated with the mine/mill complex would approximate 4,250 acre-feet per year. Combining this figure with existing groundwater use (approximately 260 acre-feet per year) results in a total groundwater loss during project operation which is within the perennial yield value estimated by Rush and Schroer (1970).

Thus, the project-related groundwater withdrawals would not be expected to affect other local water uses and no significant impacts on groundwater hydrology are anticipated. It should be noted, however, that the water withdrawn for the mine/mill operation would otherwise move southward into the southern portion of Tonopah Flat. In this area, a gradual lowering of the water table would occur. The magnitude of the lowering is unknown. The duration of the effect would be approximately 20 years (length of time of project operation); however, the effects would not be felt for possibly hundreds of years following project operation (Hydrosearch 1976b).

Unavoidable Adverse Impacts

No significant unavoidable adverse impacts on water resources would occur due to the Proposed Action.

Vegetation

Specific Assumptions and Analysis Guidelines

The following specific assumptions were utilized in completing the analysis of impacts to vegetation:

TABLE 3-6

LOCAL/REGIONAL DRAWDOWN EFFECTS OF THE NEVADA MOLY PROJECT GROUNDWATER WITHDRAWALS

	Example Operating Pumping Conditions					
	A	B	C	D	E	F
Pumping period (days)	100	1,000	10,000	100	1,000	10,000
Pumping rate (gpm)	800	800	800	2,000	2,000	2,000
Aquifer characteristics:						
Transmissivity (gpd/ft)	122,800	122,800	122,800	122,800	122,800	122,800
Storage coefficient[1]	0.12	0.12	0.12	0.12	0.12	0.12
Drawdown[2] (ft) at distance (ft) from well						
10	9.4	11.1	12.8	23.6	27.9	32.1
100	6.0	7.8	9.4	15.0	19.4	23.6
1,000	2.5	4.2	6.0	6.4	10.6	15.0
10,000	0	1.0	2.5	0	2.1	6.4
Radius of cone of influence (mi) where drawdown is zero	1	3	10	1	3	10

[1]Generally, storage coefficient for an unconfined aquifer corresponds to its specific yield; in alluvium aquifers this ranges from 0.10 to 0.15; for calculation purposes a mid-value of 0.12 was chosen.

[2]Does not take into consideration the effects of any boundary conditions.

Source: Hydro-Search, Inc. 1975. Development and testing well R. H. No. 142, Hall property, Tonopah, Nevada. Prepared for the Anaconda Company.

1. It was assumed that the drainage zone included in the design of the tailings dam would function effectively in limiting horizontal movement of tailings liquid. As such, it was assumed that tailings liquids would not affect the root zones of vegetation outside the tailings embankment.
2. It was assumed that measures of dust control, as discussed in Chapter 1, would be sufficient to assure that vegetation growth would not be negatively affected by dust emissions.
3. It was assumed that estimates of carrying capacity by allotment are adequate for estimating animal unit month (AUM) reductions resulting from rangeland reductions caused by implementing the project. It was assumed that the average available vegetation for the San Antone allotment is representative of the available forage on the mine/mill complex and that the available forage of all allotments in the Big Smoky Valley and surrounding mountains is representative of the forage production in the vicinity of the transmission line.
4. Based on the discussion of impacts of the Proposed Action on soils, there is some uncertainty regarding the potential for successful revegetation of the tailings dam, tailings pond and waste disposal areas of the mine/mill complex. Consequently, worst-case analysis was warranted and the assumption was made that successful revegetation of these areas would not occur. Thus, disturbances associated with these areas are considered permanent, as are those for the mine pit.

Impacts

Impacts to vegetation resources would result from clearing of vegetation during construction of the transmission line and construction and operation of the mine/mill complex. Transmission line construction would result in permanent disturbance of 87 acres of vegetation (switching station and access trail) and temporary disturbance of 11 acres of vegetation (materials storage yard and tower sites). Mine/mill construction and operation would result in permanent removal of 2,521 acres of

vegetation (assuming revegetation would not be attempted on the mine pit; revegetation would fail on the tailings dam, tailings pond and waste disposal areas); and temporary removal of 419 acres (mill and office complex, soil stockpile, and utility corridor area). Significance of the impacts is defined in relationship to three elements:

- the magnitude of losses of herbage production and potential indirect effects on livestock or wildlife food sources;
- the quality or character of the vegetation in terms of wildlife habitat;
- the degree of concern that Federal or state agencies or other interested parties have for individual plant species which would potentially be affected.

Vegetation disturbances associated with the Proposed Action were evaluated relative to these criteria. Conclusions were that, under a worst-case analysis, disturbance of vegetation at the mine/mill complex would harm candidate threatened and endangered plants described in Chapter 2. Since the status of these species is of concern to some interested parties, the impact is considered significant (ERT Vegetation Technical Report 1980).

The conclusion that significant impacts to candidate threatened and endangered plants would result at the mine/mill complex was based on the potential occurrence of the fishhook cactus (*Sclerocactus polyancistrus*) and several other species on the mine/mill site (see Table 2-6). Although the actual occurrence of the species is unknown, the worst-case scenario was that they occur at the site and would be disturbed. This would be a direct, significant impact.

As stated in Chapter 1, a search for candidate threatened and endangered plants would be conducted at the mine/mill complex. If specimens of these species of concern were encountered, they would be transplanted to a suitable area of habitat nearby or donated to a regional botanical garden. This would partially mitigate the adverse impact; however, since the potential survival of the transplanted plants is unknown, the impact would still be considered significant.

Details of the analysis of other potential impacts deemed insignificant are presented in the ERT Vegetation Technical Report (1980) and summarized below:

1. Impacts to candidate threatened and endangered plants along the transmission line route would not occur because of the inclusion in Chapter 1 of mitigation measures to search for and avoid disturbance of such species.
2. Losses of vegetative productivity on disturbed areas would occur, but would not be significant because of the low annual average productivity of affected areas and the comparatively small area of disturbance (on a regional basis).
3. Losses of vegetation used as wildlife habitat were not considered significant because no areas defined as significant (see Chapter 2, Wildlife section) would be affected and because the size of the area affected is small in comparison to the available similar habitat in the region.

Unavoidable Adverse Impacts

Construction of the mine/mill facilities could result in disturbance of candidate threatened or endangered plants. It is not known for certain if the species actually occur in affected areas, but in the absence of information to the contrary, a worst-case assumption is that the plants would be affected. Transplanting of plants found during a search of the site would partially mitigate the impacts; however, since their potential for survival is uncertain, the impact would still be significant.

Wildlife

Specific Assumptions and Analysis Guidelines

The analysis of impacts to wildlife was based on the list of general assumptions provided at the beginning of this chapter and specific assumptions as follows:

1. Based on the discussion of impacts to soils in this chapter, there is some uncertainty regarding the potential for successful revegetation of the tailings dam, tailings pond, and waste disposal areas of the mine/mill complex. Consequently, worst-case analysis is warranted and the assumption was made that successful revegetation of these areas would not occur. Thus, disturbances associated with these areas are considered permanent, as are those for the mine pit.
2. All electric distribution lines in the mine/mill complex would be constructed according to specifications that reduce the possibility of electrocution of raptorial birds (Miller et al. 1975).
3. A 230kv transmission line does not pose an electrocution risk for raptors. Dimensions shown in Chapter 1 show that distances between conductors and any potential ground are greater than the wingspan of eagles, the largest bird in the area. Nearly all electrocutions of birds contacting power lines occur on smaller

distribution lines and not on high voltage transmission lines (Thompson 1977).

4. Oxidants potentially produced by corona discharge from electrical apparatus, including ozone and oxides of nitrogen, would not be produced in quantities harmful to animals (Thompson 1977).
5. Electromagnetic fields surrounding the transmission line would have no harmful physiological effects on nearby wildlife (Thompson 1977).
6. Quality of the tailings liquid would not be worse than that predicted in Table 3-5 (see Water Resources section of this chapter). Predicted quality of the tailings water indicates that the water would meet Federal drinking water standards except for fluoride, manganese, sulfates, and total suspended solids. These elevated levels are not high enough to cause harm to wildlife. The following supports the conclusion that the tailings pond would not harm wildlife: (1) Kienholz (1977) fed raw tailings from a similar operation in Colorado to baby chickens (as much as 20 percent of the diet) and no adverse effects on growth pattern or survivorship were noted. (2) Brown (personal communication 1979) and Stark (personal communication 1979) said that waterfowl use tailings ponds at molybdenum mills in Colorado and New Mexico without ill effect.

Impacts

Because of their variety, mobility, complex life histories and complex life requisites, and sensitivity to environmental change, wildlife species can potentially be affected by development in many ways. A detailed analysis of the potential and actual impacts of the Proposed Action on wildlife was conducted in the ERT Wildlife Technical Report (1980). Significance of impacts was evaluated relative to the:

- magnitude of expected changes in wildlife habitats defined as significant in Chapter 2, and,
- magnitude of expected changes in populations of animals defined as significant in Chapter 2.

Conclusions reached in the ERT Wildlife Technical Report (1980) were that the Proposed Action would result, under a worst-case analysis, in significant impacts to sage grouse. As noted in Chapter 2, the proposed transmission line passes within one-half mile of a strutting ground, near the north end of the line. Although the ground itself would not be disturbed, potential impacts could result through (1) loss of nesting habitat adjacent to the ground or (2) disturbance of breeding sage grouse by eagles which may use the transmission line towers as hunting perches. The net result could be a local decrease in sage grouse nesting success.

Wildlife biologists of the BLM, Nevada Department of Wildlife, and ERT met in March 1980 to discuss the potential significance of these impacts and concluded that the loss of nesting habitat and potential for increased disturbance by raptors would probably not result in significant impacts to sage grouse populations (Molini, personal communication 1980). However, since the specific characteristics of the site are not known, a potential for significant impact remains and it was agreed that a worst-case analysis was warranted. Under this analysis, the conclusion was that sage grouse nesting success would be significantly adversely affected.

Various insignificant impacts would also occuras a result of the Proposed Action. These are discussed in detail in the technical report, and briefly summarized as follows: (1) permanent losses of 2,608 acres of desert shrub habitat (87 acres for transmission line; 2,521 acres for mine/mill) would occur but are insignificant because of the widespread occurrence of similar habitat in the region; (2) temporary losses of 430 acres of desert shrub habitat (419 acres for mine/mill; 11 acres for transmission line) would occur, but are insignificant for the reason stated above; (3) direct mortality to unknown numbers of rodents and reptiles would occur, but would not affect species defined as significant; (4) displacement of songbirds, kit fox, and other mobile species would occur. Raptors would be displaced from hunting grounds of the mine/mill site, but this would be insignificant because similar habitat is widely available. Burrowing owls would be displaced from nest sites, but would not be adversely affected because they change nest sites regularly (Butts 1973) and adjacent areas contain many suitable nest sites; (5) increased human activity in the vicinity of the mine/mill would result in unquantified increases in vehicle-wildlife collisions, illegal shooting, and disturbance. These impacts would be insignificant because they would not affect populations of significant species; (6) increased raptor utilization of the east side of the Big Smoky Valley would result from use of the transmission line towers as perch sites and possibly as nest sites (Gilmer and Wiehe 1977). This would be a beneficial impact, considered insignificant because the extent of its occurrence is unknown. (7) The aquatic-riparian habitat at Moore's Creek would be crossed by the trans-

mission line. Mitigation measures in Chapter 1 stipulate that a 300-foot buffer would be left on each side of the stream and that no towers would be built in the stream. This would limit the potential disturbance to the 8-foot access trail. This loss of a very small area of habitat is not considered significant; (8) groundwater pumping at the mine/mill would not impact the aquatic-riparian habitat of Liberty Springs; (9) no impacts to the endangered bald eagle or any of the candidate threatened and endangered species listed in Table 2-7 would occur, (ERT Wildlife Technical Report 1980).

Mitigation Measures

Because of the potential for significant impacts to sage grouse, the following mitigation measures were identified. The exact boundaries of the sage grouse strutting ground and the location of nearby nesting habitat would be determined by biologists with the Nevada Department of Wildlife and BLM. If these biologists determined that significant impacts would result from the proposed transmission line, the design of the transmission line and its location would be modified as necessary to prevent significant impact. Specific measures could include relocation of the transmission line and local modification of tower design to prevent raptor use.

Unavoidable Adverse Impacts

After implementation of the mitigation measures described above no significant unavoidable adverse impacts to wildlife species or habitats would result from implementation of the Proposed Action.

Cultural Resources

Specific Assumption and Analysis Guidelines

The field survey practices associated with the mine/mill site and powerline corridors were performed in accordance with practices currently used by the Bureau of Land Management for Class II and Class III cultural resource surveys (See Appendix C for methodologies). Evaluation of prehistoric and historic sites was formulated based on assembled documentation from research and field studies. National Register eligibility criteria contained in 36 CFR 120 (formerly 36 CFR 66), regional historic significance, provided the guidelines and criteria of significance for evaluating the specific resources identified by this project.

Impacts

Prehistoric. The ten prehistoric sites located within the proposed transmission line route (Table 2-7), represent small single task activity areas. These sites can yield archeological information which is important to understanding the settlement subsistence pattern of the Big Smoky Valley. Therefore, they are eligible for the National Register of Historic places, according to the criteria listed in the Procedures for the Protection of Historic and Cultural Resources (Title 36; 800.10).

The sites located in the transmission line construction area would be directly affected by construction activities. However, this is not a significant adverse impact because the BLM Class III mitigation program described in Chapter 1 would mitigate the adverse effects to the cultural resources of Big Smoky Valley adequately by surface collection, curation of specimens, and preparation of a report of the study (ERT Cultural Resources Technical Report 1980). The integrity of the salvaged sites would be lost but this is not considered a significant impact because the knowledge and history of the site would be recorded for the interpretation and understanding of future generations.

Historical Sites. As indicated in Chapter 2, there are no historical sites within the mine/mill complex, but there are two historic sites (Blue Jack and Liberty Mines) adjacent to the mine/mill complex which would be indirectly affected by the Nevada Moly Project.

According to the Nevada State Museum, the Liberty Mine ruins are eligible for inclusion in the National Register according to Criterion 4 under Title 36, Part 800.10 (Procedures for the Protection of Historic and Cultural Properties) (ERT Cultural Resources Technical Report 1980).

The construction and operation of the project would result in additional mining personnel and would increase the population in the immediate area. It is assumed that there would be an increase in site visits to both mines. However, the actual number of site visits and damage to the site is difficult to predict. Assuming worst-case analysis, indirect impacts resulting from increased site visits to the Blue Jack and Liberty Mines would significantly affect the historical values of the Big Smoky Valley because the potential for eligibility for these sites to the National Register would be reduced due to destruction of the sites.

A single historic site exists within the proposed route's corridor. If directly impacted by the construction activities, the impact to the site would not be considered significant because mitigation would be accomplished (Chapter 1). The systematic collection and recording of the site would provide histor-

ical documentation for understanding Round Mountain's mining industry. Therefore, the indirect impact to the site is considered to be insignificant.

Approximately 23 historical trails or stage roads intersect the proposed powerline corridor (Table 2-8). Construction of access routes across these trails or roads would directly affect the historical value of these features. The significance of this impact is difficult to predict because many of the original routes in the valley have been significantly altered through modern vehicle use or road upgrading. If the altered routes are directly affected by transmission line construction, it is assumed that the direct impact is insignificant because their present historic value is low. However, the routes which remain reflect transportation by wagon or stage and therefore represent valuable historical features associated with the historic development of the Big Smoky Valley. If these routes are directly impacted by transmission line construction activities, it is assumed that this would represent a significant direct impact because their historic value to the Big Smoky Valley is great and valuable historic features and values would be lost (ERT Cultural Resources Technical Report 1980).

Unavoidable Adverse Impacts

The loss of the integrity of the prehistoric sites salvaged within the transmission line corridor is an insignificant unavoidable adverse impact. Two historic mining sites (Liberty and Blue Jack Mine) which are located near the mine/mill complex would be significantly indirectly affected due to destruction associated with increased site visitation. Damage to the historical trails or stage roads with high regional value to Big Smoky Valley which would be impacted by transmission line construction would be considered a significant unavoidable adverse impact.

Visual Resources

Specific Assumptions and Analysis Guidelines

Visual impacts caused by the mine/mill complex and transmission line are defined through the application of the Bureau of Land Management Visual Contrast Rating System. Significance of impact was determined by using the contrast rating for the various Visual Resource Management (VRM) classes. Technical details and methodology are contained in the ERT Visual Resources Technical Report (1980) and Appendix D. The visual contrast analyses were performed from a point 3 miles directly west of the site.

Visual impact analyses for the transmission line were performed from the intersections of Route 50, Highway 376, and the proposed corridor.

Impacts

The construction of the mine/mill complex would impact the visual quality of the project area. It is estimated that the visual contrasts associated with construction of the mine pit, tailings dam and pond, and four waste disposal areas at the mine/mill complex would be significant. As discussed under the Topography Section, these facilities would produce substantial changes from existing topography and would be visible from as far as 25 miles west of the site (see Figure 3-2 for a computer simulation of future topography at the mine/mill site). As indicated in Chapter 2, the mine/mill site is located in a Class IV area; the form and color contrasts associated with the new landforms would exceed the allowable contrast for the Class IV areas.

The major causes of the predicted visual contrasts would be differences in the color of the pit, tailings, and waste disposal areas relative to the surrounding vegetation, and differences in their shape and form relative to existing topography. Establishment of vegetation on these areas and grading to blend with existing contours would reduce this visual impact to acceptable levels. However, as indicated in the Soils Section (Chapter 3), the worst-case analysis indicates that revegetation would fail. Therefore, the visual impacts caused by construction of the facilities at the mine/mill complex would be significant (ERT Visual Resources Technical Report 1980).

Construction of the transmission line would represent a visual intrusion for those individuals in the immediate area (Figure 1-5), but it would not significantly affect the visual resource quality of the entire Big Smoky Valley. There would be color contrasts associated with the dark brown transmission towers superimposed upon the dominantly gray-green landscape. The transmission line would be most visible at the intersection of Route 50 and Highway 376. It would be less visible in the Carver's Junction/Round Mountain area and seen only intermittently from Round Mountain to Route 50. As indicated in Chapter 2, the transmission line would cross approximately 80 miles of land classified as Class IV and 6 miles of land classified as Class V (see Table 2-11 for definition of classes). The visual contrast impacts associated with the transmission line would be within the allowable contrast for Class IV and V areas. However, visual impacts

caused by the proposed structures are estimated to be significant in the areas within 1.5 miles of Routes 50 and 376 due to the discordance of color. This would represent a significant impact for a 22.5-mile distance. With the exception of the 22.5-mile stretch, the visual impacts for the majority of line would not be significant (ERT Visual Resources Report 1980).

Mitigation Measures for Visual Resources

The strong color-related contrasts caused by the pentachlorophenol-treated Douglas Fir poles and metal cross braces would cause significant visual impacts for an area 22.5 miles long which is within 1.5 miles of Routes 50 and 376. The visual impacts would be mitigated by using Western Red Cedar poles and cross braces. These poles would reduce the contrast to a level which falls within BLM Class III and Class IV restrictions.

Unavoidable Adverse Impacts

There would be significant adverse visual impacts at the mine/mill site. The visual contrast associated with construction of the mine/mill would exceed the allowable contrast values for a VRM Class IV area. The construction of the transmission line would represent a visual intrusion for those individuals in the Big Smoky Valley. However, the contrast values would be within restrictions for BLM Class IV and V areas and, after mitigation, would not significantly affect visual resources.

Noise

Impacts

The major sources of noise from the project would include rock drilling, blasting, loading of rock and ore, haul trucks, the ore crusher, and mill itself. Using these noise sources and maximum noise assumptions regarding noise propagation, results of noise levels from the mine/mill complex would be equal to or less than existing ambient noise levels of 15 to 45 decibels at A-weighted (dBA) at distances of 5 to 10 miles. This distance is less in those directions for which the steepness of the terrain would act as a barrier for sound propagation (east, northeast, and southeast) (See Appendix G for noise methodology).

An indication of maximum magnitude of blast noise may be made using the scaling approach and data presented by Siskind and Summers (1974). Based on this information, the predicted blast noise values at the mine/mill would be around 75 decibels (dB) (ERT Noise Technical Report 1980).

There are no official blast noise standards for protecting a community such as Tonopah from property damage, annoyance, and other impacts. However, Siskind and Summers (1974) present a proposed interim set of sound level standards which range from 136 dB, as the limit of allowable impulsive noise, down to 128 dB as the safe level.

The predicted blast noise at the mine/mill complex results in community sound levels more than several orders of magnitude below these proposed standards. On this basis, it was concluded that blasting at the site would produce little or no impact to the residents of Tonopah.

Activities at the mine/mill complex would produce noise emissions ranging from 87 to 98 dBA at a distance of 50 feet. This would represent an increase in noise levels to the workers within 50 feet of the noise source and would be considered a nuisance. However, these noise levels would still be well below the standard of 128 dBA and are considered insignificant impacts to the workers.

Based upon the relatively low levels of noise due to the mine/mill complex and the general lack of ranchers or other individuals within 5 to 10 miles, environmental noise impacts of the mine/mill complex are not considered significant.

Transmission line construction would be completed within a relatively brief time span (approximately 5 months) and would require the following quantity of equipment potentially significant from a noise standpoint: one air compressor, a backhoe machine or auger truck, several boom/crane trucks (for tower erection), and a tensioner (conductor puller) truck. Noise levels from heavy duty diesel-powered equipment of this category are typically in the 80 to 90 dBA range, at 50-foot reference distance (U.S. Environmental Protection Agency 1971b). This would represent an increase in noise levels to the construction workers within 50 feet of the noise source and would be considered a nuisance. However, these noise levels would still be well below the standard of 128 dBA and are considered insignificant impacts to the workers. At distances of 1 mile or more, the resulting maximum noise levels due to the construction of the transmission line are predicted to be less than 40 to 50 dBA. With background noise levels in the range of 15 to 45 dBA, the noise from construction of the line would be generally inaudible to an observer beyond 1 mile and are not considered to be significant (ERT Noise Technical Report 1980).

The briefness of any potential exposure and lack of ranchers or other individuals in the vicinity of the transmission line construction

indicate that noise impacts due to this operation would be insignificant. Noise impacts associated with the operation of the proposed 230kv transmission line would not be significant due to the types of noise sources and remoteness of the line from ranchers or other individuals.

Unavoidable Adverse Impacts

There would be an increase in noise levels associated with project construction and operation but these levels are not significant unavoidable adverse impacts and would not significantly affect construction workers, sensitive land uses, or receptors.

Recreation

Impacts

Based on a population increase of over 2,000 people in the Tonopah area by 1982, the implementation of the Proposed Action would result in a significant increase in demand on local recreational resources. The increased population would add to the number of participants in outdoor recreation, particularly in those activities where participation is not restricted or only requires a license, e.g., backpacking and fishing. These increases would not result in any significant reductions in the recreation experiences of most of the participants, since many of the activities are of a dispersed nature, pursued by individuals or small groups of people. There would, however, be a significant adverse impact created due to the increased demand for limited campsites, resulting in overcrowding, etc., and reducing the quality of the recreation experience of parties so affected. An indirect effect of the increased demand and possible congestion would be that some recreationists would drive further to other areas increasing the use of those facilities, e.g., campsites in Lander County. Depending upon current utilization rates at those sites, similar adverse impacts could occur (Michely, personal communication 1980).

In controlled participation activities, e.g., big game licenses issued by lottery, the number of participants would not change; but the participation rate would be reduced because of increased population. While collectively the reduction might seem insignificant, individuals whose participation rate would be reduced would perceive this as a significant adverse impact.

The increased population would require additional measures to manage the available resources; however, specific measures are not known (Michely, personal communication 1980). Other recreational resources, such as the ghost towns identified in the Recreation section in Chapter 2, would also experience an unquantifiable increase in the number of visitors.

The town of Tonopah would be more directly affected than Nye County as a whole, as increasing population would create demands for additional community recreational facilities in Tonopah. Public recreational facilities at Servicemen's Memorial Park, such as the outdoor swimming pool, would experience increased usage, and the demands for the limited indoor facilities described in the Recreation section in Chapter 2 would further strain the capacity of those facilities. Current organized recreation programs, e.g., softball leagues, would need to be expanded and additional facilities would be needed, especially playing fields and an indoor gym. Plans currently under consideration to expand the inventory of the town's recreational facilities, e.g., new softball fields on lands acquired from the BLM, taken together with the gymnasium to be included at the new elementary school, and the dedication of public use land in the proposed residential development area would provide adequate open/recreation space in the future (ERT Socioeconomics Technical Report 1980).

Additional recreational opportunities may be forthcoming from the private sector. Currently, Tonopah has no movie theaters, bowling alleys, etc.; with a higher population base, such establishments may be attracted to the area as part of the expansion of the economic base, as discussed in the Socioeconomics section of this chapter. Based upon conversations with local residents regarding recreation needs, the development of any such facilities would be a significant indirect beneficial impact.

Unavoidable Adverse Impacts

An increase in demand for recreational resources and facilities beyond capacity for Nye County and the Town of Tonopah would represent an unavoidable significant adverse impact. In addition, the increased demand for limited indoor recreational facilities would also be an unavoidable adverse impact.

Land Use and Land Use Controls

Impacts

The proposed mine/mill operation would occur on privately owned land and on mining claims on public lands (see Map 1-1). The land has historically been used for livestock grazing. Of the 9,000 acres controlled by ACC, 2,940 acres would be actively used for the mine/mill operation (Anaconda 1979). The remaining land

would continue to be used for livestock grazing.

The increase in population associated with the operation of the mine/mill would necessitate additional land development for housing, parks/open space, commercial/industrial, and public uses. The majority of such development would occur in Tonopah, where most of the inmigrating population would be expected to reside.

Using a standard of 12.67 acres/100 additional people, most of which would be used for residential purposes, the proposed action would necessitate the rapid development of approximately 264 acres of land, changing the uses from open space and grazing to residential and commercial. This is in addition to the 114 acres needed to meet the expected baseline population growth from 1980 through 2001. This is considered to be a significant land use impact because it would nearly double the developed acreage of Tonopah, currently estimated at approximately 300 acres, in less than two years' time.

It is not expected that availability of land would be a significant problem because it is assumed that the 600-acre ACC parcel would be made available for development on schedule and that the BLM would continue to permit transfer of lands to accommodate community growth.

Land use effects of the proposed transmission line route would be insignificant (ERT Socioeconomics Technical Report 1980).

No significant effects on land use controls in Nye County would be expected as a result of the proposed project.

Unavoidable Adverse Impacts

An unavoidable adverse impact of the Proposed Action would be the conversion of approximately 3,204 acres of privately owned land from its current uses (open space and grazing) to industrial, residential, and to a lesser extent, commercial and public uses. Some observers who oppose any significant change from the rural agrarian character of Nye County would consider this an adverse impact.

Livestock Grazing

Impacts

Temporary and permanent losses of rangeland would result in displacement of wildlife and livestock onto adjacent rangeland where utilization above current levels may occur. Livestock reductions may be required proportionate to rangeland losses associated with the project.

An estimated 77 AUMs per year would be lost due to development of the mine/mill complex. Assuming the worst-case, that revegetation would fail on the tailings dam and pond and waste disposal areas, approximately 66 AUMs per year would be permanently lost; the remaining 11 would be lost for the life of the project only. For comparison purposes, these losses would comprise less than 0.7 percent of the San Antone allotment, and are not considered to be significant. Grazing losses due to construction of the proposed transmission line would approximate 3.6 AUMs per year; 3.2 AUMs per year would be the permanent loss. These losses represent less than 0.01 percent of the more than 31,000 AUMs per year presently allotted on public lands alone in the Big Smoky Valley and vicinity and, thus, are not considered significant.

Unavoidable Adverse Impacts

Losses of 77 AUMs per year at the mine/mill site and 3.6 AUMs per year on the transmission line route would be unavoidable. These impacts would not be significant in relation to the available AUMs in the San Antone allotment and the Big Smoky Valley.

Mineral Resources

Impacts

The proposed project would, by design, remove approximately 150 million metric tons of molybdenum and copper ore from the Big Smoky Valley reserves. The sheer volume of ore removed from the resource would be significant. The ore produced at the mine would help meet the nation's demand for molybdenum. No other significant impacts to mineral resources would occur.

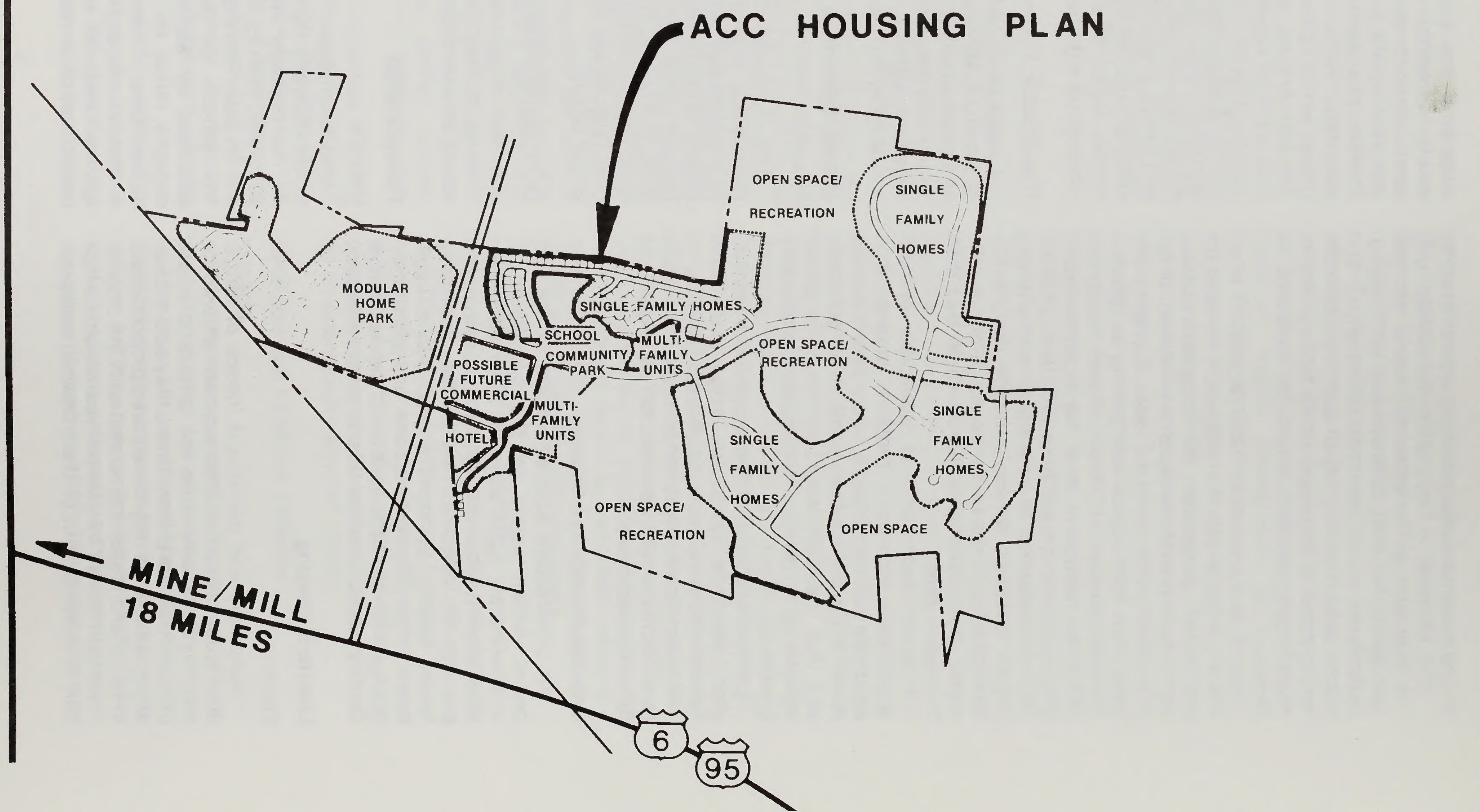
Unavoidable Adverse Impacts

If the Proposed Action is implemented, removal of the 150 million metric tons of ore would be unavoidable.

Transportation

Impacts

Implementation of the Proposed Action would increase the amount of vehicular traffic on the highway network, particularly on the combined U.S. 95 route northwest of Tonopah and on State Road 89 to the mine site (Map 3-1). The effects of the increased traffic were assessed by estimating the future volume/capacity ratios for each route. Capacity was defined for a "C" level of service, i.e., providing a relative free flow of traffic averaging approximately 50 miles per hour with some restriction of maneuverability. Future traffic


ACC HOUSING PLAN
MODULAR HOME PARK
POSSIBLE FUTURE COMMERCIAL
HOTEL
SCHOOL
COMMUNITY PARK
SINGLE FAMILY HOMES
MULTI-FAMILY UNITS
MULTI-FAMILY UNITS
OPEN SPACE/ RECREATION
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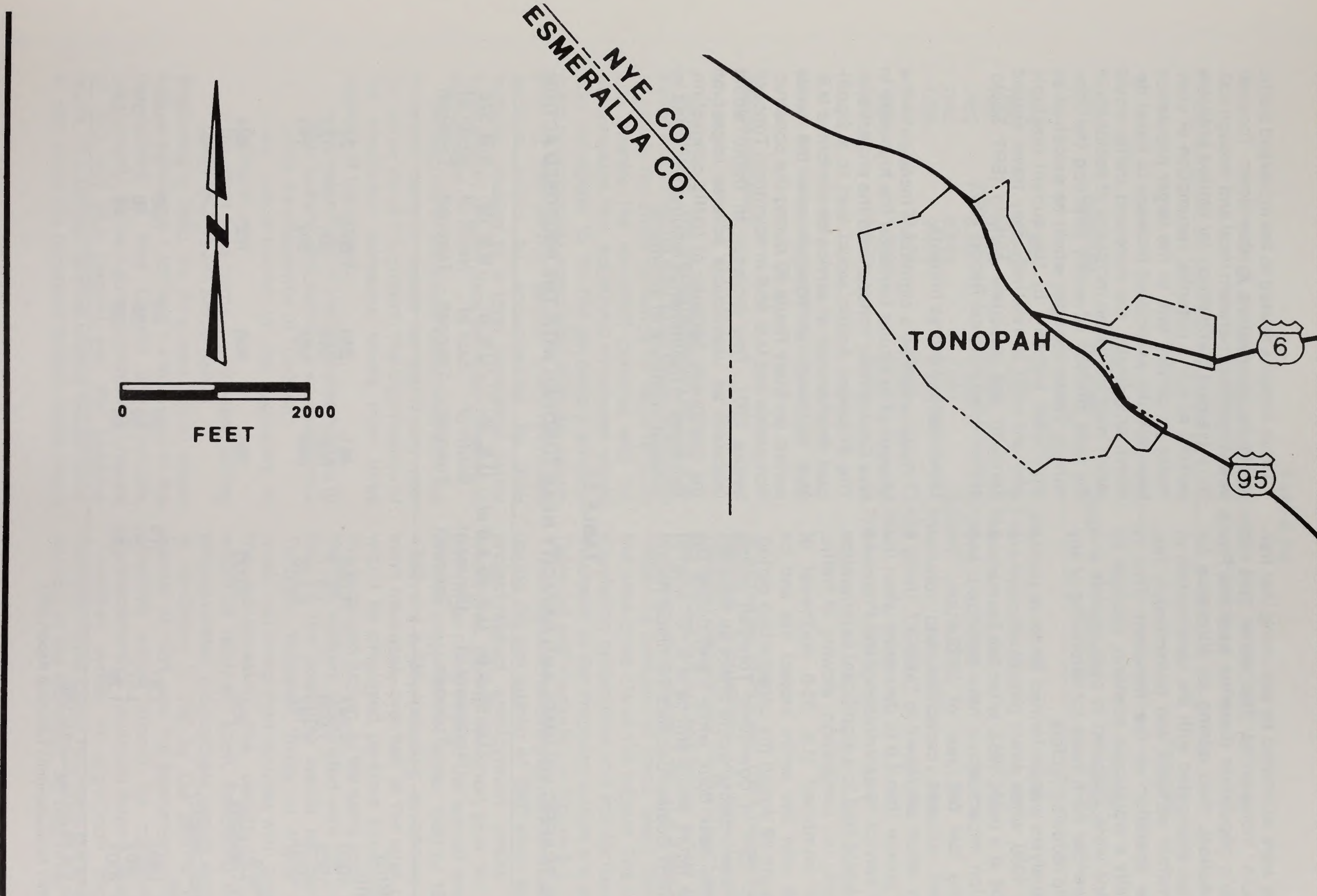


MAP 3-1. Tonopah and the Proposed Anaconda Housing Plan

volumes were estimated by assuming that traffic would increase at the same rate as Tonopah's population (baseline plus the Proposed Action), then adding an allowance for work trips associated with the construction of the mine/mill complex and transmission line, and the operation of the mine/mill. This is essentially a worst-case scenario, because all work trips were allocated to peak periods and no allowances were made for carpooling or any other trip-reducing factors.

The analysis was performed for three points in time: 1980, when direct project employment would be at a peak; 1983, when the permanent population impact would have stabilized; and 2001, the last full year of production. The estimated volumes, capacities, and volume/capacity ratios are shown in Table 3-7. Using a ratio of greater than 1.0 to determine when the level of service is deteriorating, the Proposed Action would lead to a significant deterioration of service, i.e., congestion, slowing of traffic, etc., on combined U.S. 95-6 northwest of Tonopah over the entire project life and on State Route 89 during the construction period, and U.S. 95-6 in downtown Tonopah before 2001. These impacts would affect all travelers during the peak hour, while travel during the non-peak hours would still be at a "C" level of service (ERT Socioeconomics Technical Report 1980).

Other impacts related to the increased traffic would be congestion in downtown Tonopah due to conflicts between local and through traffic; increased competition for limited available parking space; a potential resumption of commuter air service due to the larger population base and the associated increase in travel demand; and, finally, the increased traffic would result in an increased incidence of accidents in the area, thereby adversely affecting the community. These changes would be perceived as significant primarily by the current residents who are used to relatively easy travel around Tonopah and adequate parking (ERT Socioeconomics Technical Report 1980).

Unavoidable Adverse Impacts

There would be a significant increase in the amount of vehicular traffic on the highways in Nye County near Tonopah and the project site. The Proposed Action would lead to a significant deterioration of service on combined U.S. 95-6 northwest of Tonopah over the entire period, on State Route 89 during the construction period and U.S. 95-6 in downtown Tonopah before 2001. This increase in traffic would represent an unavoidable adverse impact on the community because of traffic congestion, increases in maintenance requirements, and increased incidence of accidents.

TABLE 3-7

FUTURE TRAFFIC VOLUMES AND CAPACITY NEAR TONOPAH WITH THE PROPOSED ACTION

	U.S. 95 & 6 Northwest of Tonopah	U.S. 95 & 6 at Center of Tonopah	U.S. 95 South of Tonopah	U.S. 6 East of Tonopah	S.R. 89 North of Tonopah	S.R. 376 North of Tonopah
Peak Hour Traffic						
• 1980	1,347	1,508	461	289	1,000	247
• 1983	1,020	1,817	556	348	301	123
• 2000	1,147	2,138	654	654	302	143
Maximum Hourly Capacity	956	2,000	956	956	752[1]	624
Volume/Capacity Ratio						
• 1980	1.41	.75	.48	.30	1.33	.40
• 1983	1.07	.91	.58	.36	.40	.20
• 2001	1.20	1.09	.68	.68	.40	.23

[1]Assumes S.R. 89 will be paved in 1980.

Source: ERT Socioeconomic Technical Report 1980.

TABLE 3-8

POPULATION BASELINE AND WITH THE PROPOSED ACTION
NYE COUNTY AND TONOPAH

	Nye County			Tonopah		
Year	Baseline	Project-Related	Total	Baseline	Project Related	Total
1979	7,995	N.A.	7,995	2,100	N.A.	2,100
1980	8,160	1,550	9,710	2,145	1,470	3,615
1981	8,325	2,460	10,785	2,190	2,330	4,520
1982	8,490	2,140	10,630	2,235	2,025	4,260
1983	8,645	2,195	10,850	2,275	2,080	4,355
1988	9,460	2,195	11,655	2,490	2,080	4,570
1993	10,275	2,195	12,470	2,700	2,080	4,780
1998	11,090	2,195	13,285	2,915	2,080	4,990
2001	11,580	2,195	13,775	3,045	2,080	5,125

N.A. = Not Applicable.
Source: ERT Socioeconomic Technical Report 1980.

Socioeconomics

Impacts

Population. The implementation of the Proposed Action would lead to an influx of workers to satisfy the direct demands for labor to build and operate the mine/mill complex and the transmission line. Additional employees would also immigrate to fill the secondary employment opportunities associated with the expansion of the service sector. Many of these workers would be accompanied by their families, leading to a total population influx substantially greater than the total increase in employment.

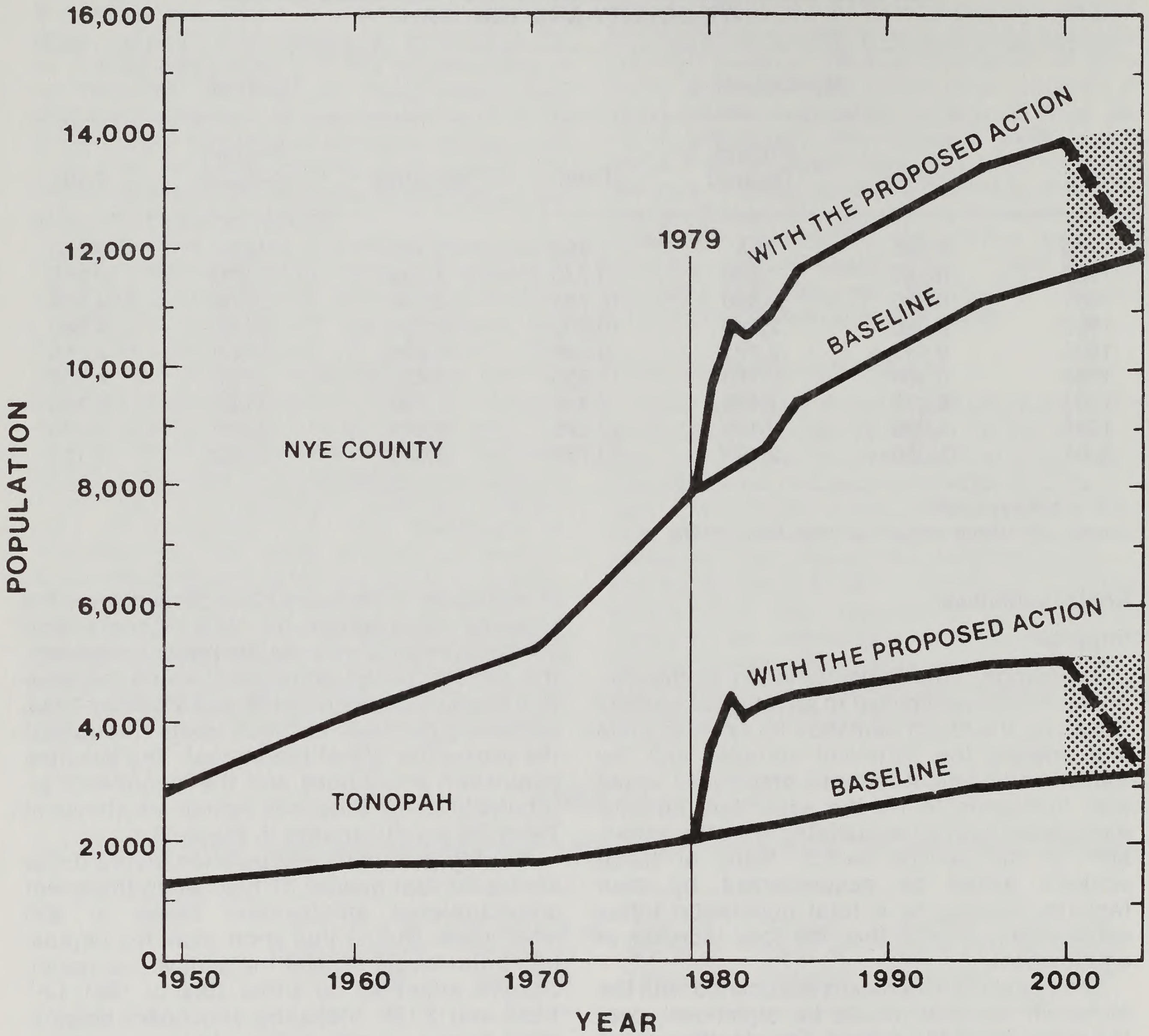
The population increases associated with the mine/mill complex would be significant over the entire life of the project. The significance of the population increases stems from three aspects of the growth:

- the magnitude of the increases relative to the current populations, i.e., nearly doubling the population of Tonopah;
- the concentration of the increases in Tonopah; and
- the short time frame, i.e., 2 years, during which the growth would occur.

Beginning in 1980, the Proposed Action would add an estimated 1,550 and 1,470 people to the populations of Nye County and Tonopah, respectively. These figures represent increases of 19.0 and 68.5 percent over the baseline levels. The largest relative impact would occur in 1981 when the Proposed Action would result in increases of 29.5 and 106.4 percent over the baseline populations of Nye County and Tonopah, respectively. As the project proceeds, the project-related population would increase to maximum levels of 2,195 and 2,080 by 1983, remaining constant at those levels throughout the productive life of the project. The baseline population projections and the increments attributable to the Proposed Action are shown in Table 3-8 and illustrated in Figure 3-3.

The highest relative population would occur during the last quarter of 1980 when the direct project-related employment peaks at 936 employees. During this short peak the population influx could exceed the annual average increases projected for either 1980 or 1981, i.e., 1,550 and 2,135. Including secondary employment increases, over half of the peak increase would be employed persons associated with the Proposed Action. At the same time, some of the 120 workers associated with the construction of the powerline would be residing in Tonopah. However, many of these workers would not bring their families with them since the transmission line construction period would be relatively short. Following the peak, project-related employment would drop sharply, declining to 736 by the end of the first quarter of 1981, and the transmission line construction would almost be complete (ERT Socioeconomics Technical Report 1980).

Another series of significant population changes would occur following the end of production at the mine/mill. At that time, the per-



Shading represents the possible range of population after production ends. Assuming the worst case, population would return to the baseline as shown by the hashed line.

Figure 3-3. Population Trends for Nye County and Tonopah with the Proposed Action
Source: ERT Socioeconomic Technical Report 1980

manent work force would decline significantly to the level necessary to complete the reclamation and clean-up of the site. This abandonment process would continue approximately one year beyond the end of production. Assuming a worst-case scenario, under which no economic diversification had occurred; no alternative employment opportunities would exist; and the induced expansion of the service sector remained totally reliant upon the mine/mill for its support; the end of production would see a decline in population back to the baseline levels. Such an outmigration would not all occur at once, but would most likely transpire over a period of years. In any event, the "bust" cycle would ultimately lead to a decline in the population of Nye County and Tonopah of 2,195 and 2,080 persons, respectively. This is the equivalent of 15.9 and 40.6 percent of the projected 2001 population including the Proposed Action. The potential decline is illustrated in Figure 3-3.

The construction of the transmission line would not result in significant population effects. As mentioned previously, the peak level of employment would coincide with the peak employment at the mine/mill and the transmission line work force would therefore contribute to the short-term population peak. However, given the short, 5-month construction schedule for the transmission line; the fact that there would be two crews, some of whom would stay in Austin, or other local communities; and the fact that construction of the transmission line would be accomplished by a series of small work parties working in sequence (which leads to fluctating employment levels); the population effects related to the proposed construction of the transmission line would be adverse, but short-lived and not significant (ERT Socioeconomics Technical Report 1980).

Employment and Income. As seen in Table 3-9, the Proposed Action would result in an average increase of approximately 1,000 employees throughout the life of the project. This is significant in that it represents a 35 percent increase over the 1976 county employment of 2,833. The total impact would be comprised of both immediate and short-term effects over the life of the project, as well as direct and indirect effects. These include the direct construction employment of up to 660 employees at the mine/mill over the two-year period, late 1979 to late 1981, and the direct permanent operating work force of employees at the mine/mill over the productive life of the operation. A temporary employment impact would be the 120 workers associated with the construction of the transmission line, during a 5-month period beginning in late 1980.

An indirect employment impact would result from the increase in secondary employment brought about by the direct increases in employment. The secondary increase would range from an average of 200 during the construction period, to 600 throughout the operating phase of the mine/mill. The expansion of the service sectors would provide

TABLE 3-9

PROJECTED AVERAGE EMPLOYMENT ASSOCIATED WITH THE PROPOSED MINE/MILL COMPLEX

	Average Annual Mine/Mill Employment		Total New Employment		
Year	Construction	Permanent	Construction	Permanent	Total
1980	388	141	582	289	871
1981	276	345	414	770	1,184
1982	0	400	0	975	975
1983	0	400	0	1,000	
1988	0	400	0	1,000	1,000
1993	0	400	0	1,000	1,000
1998	0	400	0	1,000	1,000
2001	0	400	0	1,000	1,000

Source: ERT Socioeconomic Technical Report 1980.

additional goods and services to satisfy the increased demands due to the mine/mill, its employees, and their families. The additional services could include expansion of services already available, e.g., new or expanded grocery stores and banks, or new services not currently available, e.g., a bowling alley or movie theater (ERT Socioeconomics Technical Report 1980).

Besides the short-term employment impact which would result from the Proposed Action, a peak employment would occur in late 1980. At that time, the sum of the construction, operating, and service employment could exceed 1,350 persons, i.e., the 871 direct and indirect employees shown in Table 3-9, plus the 120 transmission line construction workers, plus the 400 workers employed during the peak, over and above the annual average figures shown. Although this peak would be brief, these employees would impose further demands on an already strained service sector attempting to meet the demands of a rapidly growing population (ERT Socioeconomic Technical Report 1980).

Another impact of the Proposed Action would be the increase in income generated in the local economy. Once the permanent employment level stabilized, the annual payroll would exceed $8 million. This would indirectly generate another $10.4 million in income in the service sector. The $18.4-million total annual income associated with the proposed action would represent a significant increase of 53.2 percent of the 1977 total income of Nye County (ERT Socioeconomic Technical Report 1980). The construction payroll for the mine/mill would exceed $26 million over the two-year construction period. The construction payroll would also generate additional indirect income, however, the amount is not known.

Due to the magnitude of the projected increase in total employment, the peaking situation, and the current size of the labor force, a large number of immigrants would be needed to fill the new job opportunities. An estimate of the number of immigrants needed to fill the positions was obtained by assuming that 10 percent of the total positions would be filled by non-working residents who could be attracted into the labor force, under-employed residents, or by persons from nearby areas who would commute to work, but not reside in Nye County (ERT Socioeconomic Technical Report 1980).

Given the extremely rapid rate of growth which would occur, i.e., Tonopah's population nearly doubling in two years, it is quite likely that the local economy would not be able to respond quickly to the increased demand for labor, even with immigration. Since the employment opportunities directly associated with the mine/mill would pay relatively high wages, the service sector would not be able to compete for labor. Until sufficient immigration occurred to fill the additional positions, the service sector would not be able to expand as rapidly as desired, and would therefore not be able to meet the increased demand for goods and services. This situation would most likely prevail during the peak employment period at the end of 1980.

During this period, the increased demands for goods and services coupled with a constrained service sector, would inflate the costs of goods and services, e.g., food, clothes, and housing, both rentals and sale units. These increased costs would affect all residents of the area. At the same time, the competition for labor would tend to increase wages in the area, but by an unknown amount. However, not all residents would benefit from the higher wages. Thus, given the increasing costs affecting all persons, but only some people receiving higher wages, certain parties would be adversely affected, e.g., those on fixed incomes. These people would be forced to adjust and cope with the higher cost of living. Examples of the types of adjustments which could be necessary are: to change one's spending habits by eliminating some items, utilizing funds in savings accounts, or possibly leaving the area. In any case, while it is not known how many people would be adversely affected or how significant these effects would be, they would be significant to the individual affected if they required the individual to adjust his/her lifestyle (Bresch, personal communication 1980).

Another series of significant employment impacts would occur at the end of production of the mine/mill. At that time, most of the permanent employees of the mine/mill would become unemployed. Approximately 15 employees would remain to complete the reclamation and clean-up operations. While some of the unemployed persons could possibly find alternative employment, this cannot be guaranteed. Therefore, under a worst-case scenario, assuming that the same multiplier effect which would occur at the beginning of the project would work in reverse, employment in the service sector would also be reduced. The total impact would not occur all at once, but over time the total impact would be the unemployment of the 400 permanent project employees, and indirectly the 600 service sector employees. In essence, Nye County would return to the baseline scenario (ERT Socioeconomics Technical Report 1980).

Public Financial Resources. The Proposed Action would have both significant beneficial and significant adverse impacts on Nye County financial resources, based upon projected changes in revenues and expenditures relative to the 1979-1980 county budgets. Revenue increases would result from the revenue contributions of the mining company, its employees, and the indirect employment it supports. These contributions would be primarily in the form of property taxes, net proceeds taxes on the production of the mine/mill, and sales taxes. At the same time, the increased population would increase the demand for public services, resulting in increased expenditures. Given the limitations of available data, only the effects which can be reasonably estimated are addressed here. In order to assess the net impact, minimum levels of revenues were calculated and compared to the increase in expenditures estimated by taking the 1979-80 per capita expenditures times the increase in population.

Following the completion of construction of the mine/mill and the residential development, the Proposed Action would result in a minimum increase in county revenues of $1.7 million annually. This would be a significant, beneficial, direct impact, representing an increase of 25.3 percent over the 1979-80 revenues of $6.3 million. This increase is based upon an increase in assessed valuation of $55.2 million for the mine/mill, $7.1 million for the residential development, and net proceeds taxes of $700,000 annually. Other revenues would accrue to the county due to increased commercial development and the sales tax collections from local purchases. Insufficient data are available to estimate these resources (ERT Socioeconomic Technical Report 1980).

Another beneficial impact would be the effect of the Proposed Action on the bonding capacity of the county. As the assessed valuation increases, the county's bonding capacity would also increase at a rate equal to 10 percent of the increase in assessed valuation ($6.23 million in this case). This represents an increase of 59 percent over the existing level of $10.5 million. However, given the fact that Nye County has only used 7.8 percent of its current capacity, the additional bonding capacity would only be of limited significance (ERT Socioeconomics Technical Report 1980).

The primary impact of the Proposed Action on expenditures would be a significant increase in Nye County operating expenses. Based on a continuation of current per capita expenditures of $617, the Proposed Action would require an increase in expenditures of $1.35 million annually, caused by a maximum population influx of 2,195 persons. These expenditures would cover salaries and operations and maintenance expenses for public services. The $1.35 million is a significant impact, representing a 23.5 percent increase over current expenditures (ERT Socioeconomics Technical Report 1980).

This estimation actually overstates the expenditures impact somewhat because the $617 per capita includes an allocation for current outstanding bonded debt obligations. These expenditures would not necessarily continue with the Proposed Action because no new capital facility requirements have been identified as a result of the Proposed Action.

Comparing the projected increases in revenues with the increases in expenditures shows that the Proposed Action would have a net beneficial impact on Nye County's financial resources. However, experiences in other areas have shown that even though there may be a net financial benefit over the life of the project, there could still be significant adverse impacts on financial resources during the first several years of the project. The impact would be that the need for additional expenditures to meet the demands of the increased construction-related population would precede the accrual of additional revenues. In this instance, the increases in assessed valuation and net proceeds taxes would accrue only as construction proceeded and the mine/mill began operation. This revenue lag would strain Nye County's ability to provide needed services during the construction and early operating periods.

The problem of response lags would be compounded by the taxing and expenditure limitations discussed in Chapter 2 (also see ERT Socioeconomics Technical Report). Although the spending limitations allow for increases in expenditures for population growth and inflation, they do not allow for expected population growth. In a rapid growth situation like the one expected in Nye County, this can seriously affect the county's ability to provide expanded services, even if the revenues are available. In Nye County such a situation would mean that some services would have to be reduced for several years until additional revenues were available and the expenditure limit caught up with the population increase.

These limitations only apply, however, to expenditures which are funded from property taxes. Expenditures which are funded from other sources, e.g., Federal grants, are exempt from these limitations. Therefore, Nye County's ability to secure non-property tax revenues could reduce the magnitude of the expenditure lag problem.

For the town of Tonopah, the Proposed Action would also have both beneficial and adverse impacts similar to those for Nye County. The primary source of increased revenues would be from property tax assessments on the proposed residential development and any commercial development. As a minimum, this amount would equal nearly $117,000 annually, an 87.7 percent increase over current property tax revenues; and an increase of 23 percent in total revenues. This estimate is based on an increase in the town's assessed valuation of $7.16 million and a tax rate of $1.30/$100 of assessed valuation. The effects on total assessed valuation and bonding capacity would be of a similar magnitude (ERT Socioeconomic Technical Report 1980).

Tonopah's expenditures would also increase as a result of the Proposed Action. Current per capita general fund expenditures in Tonopah equal about $63/person (after subtracting the self-supporting program costs, such as the Tonopah Public Utilities). Assuming a continuation of the spending patterns, and a maximum increase of 3,080 persons, Tonopah's expenditures would increase approximately $131,000 annually. While the Proposed Action would not contribute as much revenue as the resulting increase in expenditures (based on this analysis), the impact of the Proposed Action would not be significant. This conclusion is based upon the fact that Tonopah provides minimal services to the population, as Nye County is responsible for most of the public services, and the fact that most of Tonopah's services are self-supporting. Therefore, the use of those services and facilities by the project-related population would contribute revenues to meet the increased expenditures (ERT Socioeconomics Technical Report 1980).

Housing. The cumulative demand for new housing for baseline and project-related population growth in Nye County from 1980 to 2001 is shown in Table 3-10.

Table 3-11 shows the estimated housing type distribution of project-related housing requirements for each time period. These figures assume one new unit would be needed for each new household, and housing preferences would approximate those typical of inmigrating workers for other similar types of projects in the west. The factors used to make these estimates are as follows:

Construction-Related Population
20% would reside in single-family homes
15% would reside in multi-family homes
40% would reside in mobile homes
25% would reside in other dwellings, including travel trailers, boarding houses, etc.

Permanent Population
35% would reside in single-family homes
15% would reside in multi-family homes
50% would reside in mobile homes

Demand for new project-related housing would peak in 1980, during the construction period, when approximately 741 new dwelling units would be needed. During 1980, the work force would be made up primarily of temporary construction workers. Consequently, a high percentage of the units needed would be motel rooms, lodging places, and travel trailers (see Table 3-11). After 1980, the transition between the construction and operating phases would shift the housing demand to reflect a greater preference for mobile homes and permanent dwellings. Thus, while Table 3-10 shows that no additional units would be needed due to the proposed project after 1981, Table 3-11 illustrates that the project-related housing market would remain active at least through 1983 to accommodate shifting preferences.

Baseline housing needs are estimated at 59 new units per year throughout the life of the proposed project as shown on Table 3-10. The estimated unit-type mix for the baseline population is illustrated in Table 2-21. Total housing demand for the projected baseline population plus the project-related population is also illustrated on Table 3-10. As shown, the combined peak demand also occurs in 1980 when an estimated 800 units would be needed.

Forecasting the response of housing suppliers to this demand is more difficult. Lacking an adequate base for predicting supply in a small, rural market area like Nye County and Tonopah, a worst-case analysis was performed.

Available information indicates that the existing housing market in Tonopah and Nye County is very tight with low vacancy rates and, probably, substandard conditions in some of the housing stock. Consequently, it is apparent that the existing stock will not meet the housing needs of the baseline population or of the project-related population.

Because there are no known homebuilders in the Tonopah area and only one mobile home dealer, it was assumed that the annual housing production capacity in Nye County would continue at a level approximately equal to the average annual production from 1970 to 1979. This production level was estimated at 95 housing units per year (see Appendix I).

It was further assumed that housing units being provided by ACC would be in addition to existing production capacity and would therefore increase the total supply capacity in Nye County. It was assumed that units being built under contract by ACC would be completed on

TABLE 3-10

TOTAL NEW HOUSING DEMAND, BY TIME PERIOD, WITH THE PROPOSED ACTION, NYE COUNTY[1]

Year	Baseline	Project-Related	Total Demand	Total Supply	Excess Supply
1980	59	741	800	221	(−579)
1981	59	210	269	95	(−174)
1982	59	0	59	95	36
1983	59	0	59	95	36
1984-1988	291	0	291	475	184
1989-1993	291	0	291	475	184
1994-1998	291	0	291	475	184
1999-2001	173	0	173	285	112
Totals	1,282	951	2,233		

[1]Assumes worst-case analysis.
Source ERT Socioeconomic Technical Report 1980.

schedule; however, no such assumption was made where ACC proposes to provide land development only and actual construction would be left to others. Under these assumptions, ACC would provide 76 motel and/or apartment units by April 1980, and 50 additional multi-family units by July 1980, or a total of 126 units in 1980 (Appendix I).

The resulting worst-case housing scenario illustrates a shortfall of 579 housing units in 1980 and an additional shortfall of 174 units in 1981 for an accumulated peak shortfall of 753 units by the end of 1981. The shortfall would begin to decline gradually in 1982. Although this is a worst-case analysis, it is clear that 753 families would not locate in Nye County if housing were unavailable for reasons described below. However, it illustrates that housing is a significant problem area considering that, as previously estimated, 90 percent of the project-related population (potentially 678 units of excess demand) would locate in or near Tonopah which presently has only an estimated 750 total housing units (ERT Socioeconomic Technical Report 1980).

There are several possible effects of a housing shortage of the magnitude described above. Although some workers and families would stay away if no housing were available, everyone who did move in would live someplace, whether in tents and camper units on the open range, doubled and tripled-up in existing housing units, or in distant locations such as Las Vegas, Carson City, or Austin. However, satisfaction with such substandard living conditions would be low. This could lead to job dissatisfaction which would translate into high turn-over, recruiting difficulties and possible delays in implementing the proposed project. It would lead also to high competition for existing

TABLE 3-11

ESTIMATED TYPE PREFERENCE FOR THE PROJECT RELATED HOUSING DEMAND, NYE COUNTY

Year	Single-Family	Multi-Family	Mobile Homes	Other[1]	Total
1980	181	111	318	131	741
1981	277	143	438	93	951
1982	256	110	365	0	731
1983-2001	263	113	374	0	750

[1]"Other" includes motels and other lodging places, travel trailers, etc.
Source: ERT Socioeconomic Technical Report 1980.

units and housing prices and rents would rise rapidly. The effects of such rapidly rising prices would be felt most severely by current residents with relatively low or fixed incomes who would be forced to compete in the same market with higher paid mine/mill personnel.

Several factors could reduce the housing shortfall in the Tonopah and Nye County areas below the worst-case level, for example, an increased use of mobile homes. Since mobile homes are produced outside the local market area and the producers would not be competing for the very tight local labor supply, the supply of mobile homes could, and probably would, expand quickly in the face of a very strong demand and accelerating prices. The home building industry would also probably expand somewhat under the same market pressures. However, all expansion of the housing supply is based on the assumption that the wastewater facilities would be expanded as described in Chapter 2. This expansion is not readily quantifiable but it would be slowed by the fact that the homebuilding industry does operate in the local labor market and, ironically, new construction workers to build homes would also be competing for the limited housing (and other services) available.

In short, the most probable housing impact under a worst-case analysis would be a significant shortfall of somewhat less than 579 housing units; the actual number is not accurately quantifiable.

Attitudes and Life-styles. Rapid growth of the magnitude anticipated to result from the proposed action inevitably brings a change in the traditional values and social structure of the community. The magnitude and direction of these changes are determined by a number of factors, including the social characteristics of the existing community, the size and rapidity of the population influx, the transient versus permanent status of newcomer groups, and the differential between "peak" impacts and longer lasting changes in the social environment. In addition, each individual's view of the changes in his perceived quality of life or life-style is a highly subjective perspective which cannot be reduced to an objective quantified assessment for an entire population or group (ERT Socioeconomics Technical Report 1980).

In this case, the Proposed Action would result in a substantial population increase within a short period of time, particularly in Tonopah, which would experience nearly a doubling of population in a two-year period. The projected effects of this rapid growth on Tonopah are based on two assumptions: (1) after an initial rapid increase the population level would reach a plateau and remain fairly steady through the year 2001, and (2) the composition of the new population would change as the temporary construction work force was replaced by the permanent work force and their families. Further, in assessing the impacts of these changes on residents' attitudes and life-styles, it was assumed that the major factors influencing residents' attitudes and life-styles would include the degree and duration of the financial burden imposed on existing residents to meet expanded infrastructure requirements and their perceptions of how project-related changes would directly affect the life-style and position of various social groups within the existing social structure.

While the "plateau" effect of sustained population levels would reduce the perceived negative impacts by eliminating the need to provide facilities and services on a temporary "peak" basis, this would be somewhat offset by the social dislocations associated with the turnover of construction versus permanent work force-related populations. The experience of similarly impacted communities indicates that transient newcomer groups tend to become alienated from long-time residents because of the temporary nature of their employment, although the permanent work force population would be assimilated into the social structure in a relatively short period of time via involvement in churches, clubs, fraternal lodges, and other formal and informal social organizations and activities (ERT Socioeconomics Technical Report 1980).

Factors which would promote positive attitudes towards the Proposed Action include the property and sales tax revenues generated by the project, which would contribute to the costs of providing the necessary capital improvements, and the development of the Anaconda Housing Plan, which would provide existing residents with housing alternatives not currently available.

It is anticipated that the reaction to the changes associated with the Proposed Action would vary among major social groups in the study area, based on how each group perceives the probable effects on their livelihood and quality of life. The greatest resistance to change would most probably occur among long-time rural residents, particularly ranchers, unless they directly benefit from the project. This group may feel that their isolated rural life-style is threatened by the influx of over 2,000 additional people into the county, bringing with them increased traffic, noise and congestion, encroaching on their privacy, and possibly diminishing their sense of place and position in

the community. The attitude of long-time residents of Tonopah and other communities toward growth would most likely reflect the degree to which they expect to benefit from the proposed population influx and other project-related changes, while experiencing less direct adverse impacts on their quality of life. In particular, local merchants and businessmen would most likely welcome growth, at least up to the point where competitors, especially chain stores, were attracted to the area. More recent community residents, including government employees, teachers, and other professional and service workers would also be likely to view the projected changes as mostly positive in terms of providing stimulus to the local economy, encouraging development of a broader range of commercial facilities and services, and promoting a greater diversity of viewpoints and interests within the local social structure (Institute for Social Science Research 1974; Gold no date; Ganzel 1976). On the other hand, those residents living on fixed incomes, particularly the elderly, would view project-related changes negatively to the extent that the inflated cost of living associated with higher incomes reduces their purchasing power for housing and other goods and services, thereby reducing their standard of living (ERT Socioeconomics Technical Report 1980).

In addition to the effects on the individual social groups described above, changes would also occur in the relationships among these groups within the overall social structure. Based on documentation of similar impact situations (Gilmore and Duff 1975; Institute for Social Science Research 1974; Gold no date), community cohesion would temporarily decline during the construction phase due to the polarity between long-time residents and the transient "newcomer" groups. Cohesiveness would gradually increase, however, as the permanent workforce is assimilated into the local social fabric. At the same time, it is anticipated that ties between the townspeople and their rural neighbors would become more tenuous. According to Ganzel, although "town people" currently tend to side with their rural neighbors in conflicts with outsiders, the nature of rural-town interaction is "minimal". It is anticipated that this relationship would be weakened by the concentration of the incoming population in Tonopah and other communities and the formation of new bonds between these newcomers and townspeople who share similar interests and a similar orientation toward the outside world, particularly merchants, government employees, and teachers. Ranchers may feel a corresponding reduction in their perceived social and political role (Ganzel 1976).

The end of production at the mine/mill would bring about another series of changes for the community, groups, and individuals. These changes would affect all members of the community as residents leave to seek alternative employment, ending or at least altering various interactions and relationships. Residents would also experience a decline in the quality of life as the service sector contracted to a sustainable level. Residents would thus have to travel to other communities to obtain goods and services which they were used to obtaining in Tonopah. Finally, the composition of the population would change, as the younger, unemployed persons leave Tonopah. Those residents who remain, i.e., those who still have jobs, or are retired, etc., would have to adjust to a new community structure, similar to what is described for the project start-up period.

In summary, the initial direct impacts would include: (1) doubling of the local population within a short time period, and (2) the temporary presence of a large construction work force with demographic characteristics and value systems which may differ considerably from those of existing local residents. Indirect impacts resulting from these changes would include social and economic dislocations associated with accommodating a large, rapid population influx; i.e., provision of housing, schools, commercial facilities; and alienation between long-time residents and "newcomer" groups, who tend not to be readily assimilated into the local social structure due to the temporary nature of their employment. These adverse impacts would be most acute during the transition period when the construction work force is replaced by the permanent work force, even though total population levels would not fluctuate as drastically as has typically occurred in other mining-impacted communities. Other direct impacts would include maintenance of substantially higher population levels over the life of the project and sustained higher levels of income and tax revenues, which would be perceived as positive by most local residents, with the probable exception of those on fixed incomes. Indirect effects would include response to provision of the community infrastructure and diversified commercial facilities and services to accommodate the expanded population, which would be viewed as positive by most residents, and the gradual assimilation of permanent employees and associated newcomer populations into the existing social structure. Some realignments among social groups would inevitable occur, with ranching groups most likely to feel that their role in the social and political

structure had been somewhat diminished relative to the increased urban population and growing importance of mining to the regional economy.

Community Facilities and Services.

SCHOOLS.—Enrollment projections for the Tonopah enrollment area of the Nye County School District indicate that the Proposed Action would increase total enrollment to 1,169 by 1981-82, from its current level of 493. These projections, carried through 1984-85 are given in Table 3-12 and show some stabilizing of enrollment after the 1981-82 peak. The enrollment increases would create significant adverse impacts on the school system. These impacts would be inadequate facility capacity and temporary financial hardship (ERT Socioeconomic Technical Report 1980).

The existing Tonopah schools have a capacity of 630 students. The project-related enrollment increases would exceed this capacity by approximately 250 students in 1980-81, and by nearly 540 students in 1981-82. Based upon a minimum standard of one classroom per 25 students, i.e., one teacher per classroom, the school district would need an additional 10 classrooms for the 1980-81 school year and 22 classrooms by 1981-82 (ERT Socioeconomic Technical Report 1980).

The school district is currently considering a proposed bond issue to build a new school in Tonopah which would accommodate the projected growth. However, even if the bond issue were passed, the facility would not be ready for some time. In the meantime, the school district would resort to interim measures to provide education, including double sessions and the use of mobile/modular units (Johnson, personal communication 1980).

Another significant direct impact of the Proposed Action would be an increase in staff. At a minimum this would include 22 additional teachers, compared with 24 currently. Administration personnel and maintenance staff increases would also be needed, but the numbers are not known. A factor which could aggravate the situation would be continued difficulty in recruiting teachers to Tonopah due to the lack of housing (Johnson, personal communication 1980), which would have other indirect impacts on the schools, e.g., overcrowded classrooms and high student/teacher ratios, which would adversely affect the quality of education. Assuming a worst-cast analysis, it is assumed that Tonopah would experience difficulty in attracting teachers and the indirect impacts on schools previously described would be considered significant.

The Proposed Action would also have significant impacts on the district's financial resources. Assuming a continuation of current spending patterns, i.e., approximately $2,238 per pupil per year, the Proposed Action would result in a peak increase in operating expenditures of $1.48 million in 1981-82, an increase of 37 percent over the current budget. These costs would go to pay for the increased staff salaries, administrative expense, supplies, etc. (ERT Socioeconomic Technical Report 1980).

In addition to the operating cost increase, estimated capital costs would be $3 million for the 22 new classrooms needed (Johnson, personal communication 1980). Assuming a bond issue would be passed to cover this cost, the Proposed Action would more than double the district's total bonded indebtedness to $5.35 million, from its current level of $2.35 million. However, this would still be only 25 percent of the district's bonding capacity, disregarding any increases in capacity which would result from the Proposed Action.

The school district's assessed valuation base is the same as Nye County. Therefore, the increase in assessed valuation associated with the Proposed Action would be identical, i.e., $62.3 million. Based upon the district's current tax levy of $0.45/$100 of assessed valuation, the Proposed Action would generate an additional $280,350 of property tax revenue, an increase of 60 percent over current property tax collection. The increase in assessed valuation would also increase the bonding capacity of the school district by $9.35 million. In all cases, the impacts are considered significant, relative to current levels of the same measure.

As a result of the Proposed Action, the Nye County School District would also receive additional state funds as part of the state's support program for education. The objective of the program is to provide funds to the schools to replace property tax revenues which were lost when the legislation establishing maximum combined tax rates reduced the maximum levy for school districts to $0.50/$100 of assessed valuation from the previous level of $1.50/$100 (see Chapter 2 and Appendix H). During the current school year the state's support equaled $1,539 per pupil. Assuming the same rate and a peak project-related enrollment of 638 students, the state's support of education would equal over $980,000 in 1982-82.

A final element of the Proposed Action's impact on the school district's financial resources would be its relationship to the overall county in terms of the combined taxing rate. The limit of $0.50/$100 of assessed valuation related only to the revenues which can be collected from

property taxes to meet operating and maintenance expenses. Levies to meet debt service obligations do not come under the $0.50/$100 limit, as long as the total levy from all taxing bodies is below the maximum of $3.64/$100. Even then, there are provisions in the law which modify the limit under certain circumstances. In any case, there are many opportunities for the various taxing jurisdictions in Nye County to work together to derive maximum financial benefit from the Proposed Action to offset the associated costs (Johnson and Hamilton, personal communications 1980).

As with population and employment, school enrollments in Nye County would decline at the end of production, i.e., 2001. Under the worst-cast analysis, all population, both directly and indirectly supported by the Proposed Action would migrate out of Nye County. The number of children enrolled in Tonopah schools in the year 2001 would leave and Tonopah's enrollment would return to baseline levels. Depending upon the magnitude of the reduction, and the period of time over which it occurs, there would be a series of adverse impacts on the school system. Assuming a worst-case analysis, the adverse impacts on the school system would include excess capacity, staff reductions, and a reduction in property tax revenues to meet operating and debt service expenses. If these impacts occur, they would be considered significant adverse impacts to the school system.

HEALTH CARE SERVICES.—The Proposed Action would create both beneficial and adverse impacts on the providers of health care services in Tonopah, as a result of the significant increase in population. Nye General Hosital and the Central Nevada Rural Health Consortium (CNRHC) would be the agencies directly impacted.

The project-related population increase would effectively double the population of Nye General Hospital's primary service area, leading to an increased patronage of the facility. Given the low current occupancy rates, no capacity problems would occur as there would still be excess capacity. The increased patronage would require two or three additional nurses to be hired, but this was not considered to be a significant impact by the hospital administrator. However, the hospital has had a difficult time recruiting staff in the past because of low wages and the lack of available housing. Should this continue to be the case in the future, a shortage of staff would occur, leading to short-term adverse impacts. This was not considered to be a significant problem by the hospital administrator (Friel, personal communication 1980).

The most likely significant impact on the hospital would be beneficial. As stated previously, an increased population base would result in higher patronage of the hospital, which would in turn increase revenues. The increased revenues would offset the costs of the additional staff, reduce the level of financial assistance required from the county, and possibly allow the hospital to offer new services. These benefits could be achieved without significantly increasing the cost of health care services, due to increased efficiencies of operation and other changes in the hospitals financial position, e.g., a lower rate of uncollectible bills due to a large number of people being covered under various health insurance programs (Friel, personal communication 1980).

The CNRHC would also be significantly impacted by the Proposed Action. The increased population would translate directly into a need for additional staff, including a doctor, a dentist, and several assistants, virtually doubling the CNRHC's current staff at the Tonopah clinic. Some additional equipment would also be needed, e.g., a dental chair and equipment. Up until now, the CNRHC has relied upon the National Health Service Corps (CORPS) to provide its doctors and dentists. However, the Corps itself has fewer doctors than are requested nationwide, so additional staffing for the CNRHC could become a problem. If unable to contract doctor's services through the Corps, the CNRHC would either have to contract with a doctor through some other means, or hope that a physician could be attracted to establish private practice in Tonopah, otherwise the level of health care would be reduced, due to a staff shortage. Much of the cost of the additional staff, e.g., physician's salaries and equipment, would be covered completely or in part by the Corps, while the remainder would be provided from the revenues received for services. Therefore, no significant impact would result on costs.

At the same time, the CNRHC would indirectly benefit from the Proposed Action as the increased population generated additional revenues in the various clinics. These additional revenues would help the CNRHC reach its declared objective of making its clinics financially self-sustaining. The larger population base would also make Tonopah more attractive to physicians seeking to establish private practice. While the likelihood of either of these events occuring is unknown, the occurrence of either would constitute a significant

TABLE 3-12

PROJECTED SCHOOL ENROLLMENT, NYE COUNTY SCHOOL DISTRICTS, TONOPAH ENROLLMENT AREA, 1979-80 TO 1984-85

Enrollment Levels With the Proposed Action	School Year 1979-80			1980-81			1981-82		
	K-6	7-12	Total	K-6	7-12	Total	K-6	7-12	Total
Construction	--	--	--	175	75	250	125	53	178
Permanent	--	--	--	80	54	134	288	192	480
Total Project Related	--	--	--	225	129	384	413	245	658
Enrollment Baseline	228	265	493	235	266	501	240	271	511
Total Enrollment	228	265	493	490	395	885	653	516	1,169

indirect benefit resulting from the Proposed Action.

Emergency service providers, i.e., the volunteer ambulance programs, the Tonopah Fire Department, and the Nye County Search and Rescue, would all indirectly experience increased demands as a result of the Proposed Action. Impacts would be in the form of increased calls for the services that each provides. Members of each group indicated that they would be able to continue to provide the current level of service, which they consider adequate, to the larger population. In fact, it was indicated that the various programs could indirectly benefit from the increased demands in that staff proficiency in handling emergencies would increase as the number of cases increased (ERT Socioeconomics Technical Report 1980).

The population downturn following the end of the project would result in another series of impacts on the provision of health care in the study area. These impacts would include reductions in staff, and possibly in services, and an increase in the amount of excess capacity at Nye General Hospital. Health care services would not necessarily return to their current status, as the baseline population of Tonopah in 2001 would be 45 greater than its current level. However, for the baseline population, these impacts would be perceived as significant if the changes resulted in a reduction in health care relative to what they were used to receiving immediately prior to the reduction.

Public Utilities and Communications.—Companies responsible for providing electrical, telephone, and propane gas services in the Tonopah area indicate that their systems have sufficient capacity to accommodate the baseline growth. One of the gas suppliers also indicated that their company had sufficient capacity to accommodate any growth associated with the Proposed Action, based on a history of no supply or delivery problems Proposed Action. The expansion program is ex-Both the electrical and telephone service managers indicated that their systems did not currently have adequate capacity to meet the increased demands associated with a larger population. However, both firms are pursuing programs which would provide adequate capacity in the near future. These plans include the installation of 400 more telephone lines by the Nevada Telephone-Telegraph Company, bringing the total to 1,400. This is expected to meet telephone needs through March 1980, at which time up to an additional 600 lines can be installed. The current system has a maximum capacity of 2,000 lines which would be reached in 1980. If all of these lines go into use, the company would consider installing a new system with a greater capacity; otherwise, some people would have to go without service (Carder, personal communication 1979).

The Sierra Pacific Power Company is pursuing plans to build a new substation near Tonopah. The resulting increased capacity would allow the system to meet any reasonable

TABLE 3-12

PROJECTED SCHOOL ENROLLMENT, NYE COUNTY SCHOOL DISTRICTS, TONOPAH ENROLLMENT AREA, 1979-80 TO 1984-85—*Continued.*

Enrollment Levels With the Proposed Action	School Year								
	1982-83			1983-84			1984-85		
	K-6	7-12	Total	K-6	7-12	Total	K-6	7-12	Total
Construction	--	--	--	--	--	--	--	--	--
Permanent	365	243	608	374	250	624	374	250	624
Total Project Related	365	243	608	374	250	624	374	250	624
Enrollment Baseline	245	276	521	249	282	531	254	286	540
Total Enrollment	610	519	1,129	623	532	1,155	628	536	1,164

Source: 1979-80. Nye County School District.
1980-81 to 1984-85, ERT Socioeconomics Technical Report 1980.

demands for residential and commercial power service, including those of the baseline and proposed action. The expansion program is expected to be completed by late 1981. In the interim period, facilities at the current substation could be expanded sufficiently to meet any anticipated residential and commercial needs (Van Pool, personal communication 1980).

The direct impact to these programs would be the costs of providing service capacity to the additional consumers. The amount of these costs is not known; however, they would in general be borne by the consumer, e.g., new consumers would have to pay for propane tanks or phone installation charges, and would not be significant. If, however, the expansion programs alter the rate structure for service in these companies, i.e., abnormally raising costs, this would affect all consumers. In general, the significance of such a change cannot be assessed. However, for certain groups, e.g., those on fixed incomes, any change in the cost of living can be considered significant (ERT Socioeconomic Technical Report 1980).

FIRE PROTECTION.—The primary impacts of the Proposed Action would be in Tonopah and at the mine/mill complex. Neither location would suffer significant impact. A fire truck, to be manned by employees in the event of a fire, would be located at the mine/mill complex.

As described in Chapter 2, the fire protection at Tonopah is highly rated and has sufficient staff and equipment to meet the baseline needs, as well as those related to the Proposed Action. According to the fire chief, an increase in population from 2,100 people to 5,100 would not have a significant effect on fire protection services including staffing, equipment, station, fire flow or water storage. He also indicated that it might later be determined that one or two additional paid firemen might be needed as a result of the Proposed Action and that average response times to the proposed residential development site would be somewhat longer than for the remainder of Tonopah. However, these were not considered to be significant impacts (Jeffrey, personal communication 1979).

LAW ENFORCEMENT.—The three principal law enforcement agencies would be directly affected by the project-related population growth, especially in the Tonopah area. The resulting impacts would be increases in some types of crime, e.g., assaults and drunkenness; increased arrests and traffic violations for the sheriff's department and highway patrol; and increased caseloads for the district attorney's office and the courts. These impacts would in time lead to increased staffing requirements including two sheriff's deputies, an additional court clerk, and, possibly, additional staff in the district attorney's office. Other indirect impacts would be the need for an additional patrol car for the sheriff and, possibly, additional office space for the district attorney's office. According to local law enforcement sources, these impacts would not be considered signifi-

cant. (Terrell, Beko, Sorensen, Knight, and Tingle, personal communications 1979).

WATER.—The Proposed Action would not result in significant impacts on Tonopah's water supply, distribution system, or storage facilities. This conclusion is supported by a recent study which indicates that Tonopah's water system has sufficient capacity to supply a population of 5,000 people with excess capacity remaining. The maximum estimated population, including that associated with the Proposed Action, would be approximately 5,000 in 2001, just prior to the end of production. Even allowing for an additional factor of 10 percent (to allow for tourists, etc., the total water demand would only be about 58 percent of the 670-gallon per minute capacity of the water supply wells (Pillsbury 1979).

There would, however, be a significant impact on the distribution system in that it would be necessary to expand it considerably to accommodate the project-related growth. The location of such expansion would be dictated by the growth patterns of the town. Anaconda has already acquired the necessary easements to allow construction of a water supply main from its proposed residential development area to the existing storage facilities. The costs of extending the water distribution system to the residential site would initially be borne by ACC and passed on to the new consumers. Thus, the costs would ultimately be borne by those who benefit from the improvements, while not impacting current customers (Wilkes, personal communication 1980).

WASTEWATER.—The Wastewater treatment system is at capacity and is in violation of state environmental quality standards; therefore, only limited new hookups are being allowed. As discussed in Chapter 2, the county is currently considering two plans to expand the capacity of the wastewater treatment facility. One is a short-term measure which would include the installation of aerators into the existing pond system. This plan has been approved for implementation by the Nevada Division of Environmental Protection (DEP) and would allow for 500 additional hookups. While no decision has been made by the county to proceed with this plan, it can be implemented and operational within two weeks of the county commissioners' approval.

The second plan includes the construction of a new treatment facility and pond system designed to accommodate a population of 5,000 people. It would also be readily expandable to provide treatment capacity for 10,000 people. At the present time, the design and grant application have been submitted to and approved by the DEP and have been forwarded to the U.S. Environmental Protection Agency (EPA). It is expected that the EPA will approve the design and grant (McCurry, personal communication 1980).

For the purposes of this analysis, it was assumed that both programs would be implemented by the county with the aerators becoming operational in March 1980 (See wastewater discussions in Chapter 2).

Using these assumptions and a worst-case assumption of the demands for wastewater services, i.e., that the work force would increase as planned with adequate housing being available, the aerator system would allow growth through approximately June 1980. Between that time and the point in time when the permanent facility is operational in December 1980, the demand for wastewater services, using the number of hookups as an indicator, would exceed available capacity by about 300 hook-ups. This situation would create a significant, direct, temporary adverse impact, in that the excess demand is the approximate equivalent of 25 percent of the system's capacity. The indirect effects which could result from this could also be significant. These could include a moratorium on new hook-ups, which would constrain the housing supply and technically would delay the construction schedule; or the construction schedule for the permanent plant could be expedited; or if all other means fail, ACC has indicated that it would intervene to insure that adequate capacity is provided, possibly by using a package treatment plant for the wastewater treatment demands associated with the residential development (Wilkes, personal communication 1980).

As with the water distribution system, the wastewater collection system would need to be expanded to accommodate the project-related growth. The additional capacity would need to be provided at the proposed residential development area. ACC has acquired the necessary right-of-way easements and would initially pay for the expansion of the system. These costs would then be passed on to the homebuyers in the area. Thus, the direct impacts would be borne by those who would benefit from the improvements. There is, however, the possibility that the expansion program could increase the rates for all users. As discussed in previous sections, the significance of such changes would vary depending upon the individual's perspective.

Following the end of production at the mine/mill and the resulting decline in population to the baseline levels, the wastewater treatment facility would have significant excess

capacity, i.e., it would only be at 60 percent of capacity. There would not, however, be any significant financial impacts as the construction costs would be fully repaid under a twenty-year financing program (ERT Socioeconomic Technical Report, 1980).

SOLID WASTE.—Increased generation of solid waste by project-related growth would bring the present landfill site to full capacity by the late 1980s, ten years sooner than under the baseline scenario. At that time, additional lands would be needed. While this could potentially be a significant problem, discussions between Nye County and the BLM have identified lands adjoining the current site as being available for expansion and these would most likely be made available to the county when needed. Thus, the BLM would probably provide the mechanism to mitigate the otherwise significant problem (Hamilton, personal communication 1980).

SOCIAL SERVICES.—The various agencies providing social service programs are expected to experience a significant increase in caseloads relative to their current demands, as a result of the Proposed Action. The programs most directly affected would be those providing supplemental assistance, e.g., food stamps and unemployment insurance, and those providing professional counseling services. These impacts would be most severe during the construction period when there would be a transition among workers, the greatest frictions among new and existing population groups, etc. The increased caseloads could create the need for additional resources and staff. Discussion with various individuals responsible for providing such services indicates that the expected increases would be met by reorganizing personnel, rescheduling, and drawing upon resource pools, thus effectively mitigating the impacts (ERT Socioeconomic Technical Report 1980).

COMMUNITY FACILITIES.—Although all of the various community facilities would experience increased patronage as a result of the Proposed Action, only two are identified which would be significantly impacted. The U.S. Post Office does not have sufficient staff and post boxes to adequately provide service for the existing population, much less its baseline growth or that associated with the Proposed Action. The postmaster indicated that unless these problems were remedied, the quality of service would be reduced significantly (Vokits, personal communication 1980).

The Tonopah Convention Center would also be significantly impacted. However, these impacts would be primarily beneficial, i.e., increased usage would generate increased revenues and an increased service sector, including motels, would increase the room tax collections which support the convention center's operations. Although unquantifiable, virtually all increases would be significant for the center which is a self-sustaining operation (ERT Socioeconomic Technical Report 1980).

Unavoidable Adverse Impacts

Population. Population would increase significantly in Nye County and Tonopah at the outset of the proposed project. The peak population increases associated with the project would be 2,460 for Nye County (29.5 percent over baseline) and 2,330 for Tonopah (106.4 percent over baseline) in 1981. The short-term increases would be 2,195 for Nye County and 2,080 for Tonopah. A significant out-migration would occur at project abandonment, when population would return to the baseline levels. Whether these impacts are beneficial or adverse depends upon the individual's perspective.

Employment and Income. The most significant unavoidable adverse employment impact would be the large number of jobs eliminated at abandonment. The unemployment of 400 employees would lead to declines in the service sector employment, ultimately affecting as many as 600 service sector employees and would lead to an out-migration of some of the labor force. The wage-price pressures associated with rapid expansion of available jobs would adversely affect persons on fixed incomes.

Thus, the Proposed Action would have a net negative impact on local financial resources during the construction period and at the end of operations. A second unavoidable adverse impact would occur at project abandonment when the property tax base would decline suddenly.

Attitudes and Lifestyles. Adverse impacts from the Proposed Action would include disruption of lifestyles of some existing residents, e.g., diminished sense of place in the community, loss of rural lifestyle with its unhurried pace, etc., and possible friction among new and existing social groups. Some residents who do not desire change would see "their" community change as new residents brought new values, mores, and attitudes with them.

Housing. Extremely high housing demands associated with the Proposed Action, the limited ability of the local market to expand its housing stock, and an already tight housing market would create temporary adverse impacts in housing. The peak housing demand would be for around 951 dwelling units in 1980.

Estimated supplies would only provide approximately 198 units, resulting in a shortage of 753 units. Therefore, unless housing is provided prior to the time when it is needed, the shortage of housing would be an unavoidable adverse impact and could limit the expansion of the work force, delaying the construction of the project.

Community Facilities and Services. Schools would be adversely impacted during the first two to three years of the project, until permanent facilities could be built. Current physical capacity would be exceeded by over 85 percent during the 1980-81 school year. An additional 22 classrooms and teachers would be required. The cost of the additional facilities and staff would be an unavoidable adverse impact. The extremely rapid enrollment growth would be offset to some extent by the school district's ability to respond fairly rapidly to increases in operating expenses, but the lag associated with property tax revenue and the time required for capital facilities construction would result in serious problems until the school district could adjust to the growth.

Health services would be directly affected by an increased need for staff. Trained medical personnel are difficult to attract to Tonopah. Therefore, any unfilled positions would indirectly translate into a reduced provision of health care services.

Unavoidable adverse law enforcement impacts would be minor, requiring some additional staff and possibly facilities, but these would not be considered significant by the affected agencies.

The project-related growth would cause unavoidable adverse impacts to the town of Tonopah's water supply system, wastewater treatment facilities, and solid waste disposal facility. Each of these facilities would require expansion of its capacity at some time during the project life to accommodate the project-related growth. The most significant impact involves the wastewater treatment system which must be improved just to meet baseline needs. Failure to provide substantial increases in capacity could either delay the project schedule or force ACC to provide treatment facilities for the residential development area.

Some minor, adverse impacts to social service programs, e.g., increased caseloads and additional resource staff requirements, would be anticipated as a result of the Proposed Action. The impacts would be greatest during the construction period.

The Post Office requires additional staff and facilities just to meet the existing demand. Therefore, by definition, any additional growth would result in additional adverse impacts, at least until such time as improvements can be implemented.

The Relationship Between Local Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

The Proposed Action involves a short-term commitment of resources for the development of the mine/mill complex and the transmission line facilities. This section describes the relationship between this short-term use of the environment and potential future long-term uses. Short-term is defined as the life span of the mine/mill facility (20 years) plus a ten-year recovery period in which abandonment and recovery efforts would be completed (30-year total). The short term lasts until the year 2011. Long term is defined as the future after the year 2011.

Air Quality

The Proposed Action would involve short-term increases in total suspended particulate (TSP) levels in the region during operation of the project. Project emissions would not violate state and Federal air quality regulations or standards. In the long term, after closure, TSP emissions due to the Proposed Action would cease and there would be no long-term effect on air quality.

Geologic Setting

The open pit mine would involve disturbance of local geologic features over 456 acres. Removal of ore and waste materials would be permanent, so the disturbance is considered long term. Removal of the ore would preclude future use of the resource.

Topography

The short-term use of the project area for construction and operation of the mine/mill complex would permanently alter the topography.

Soils

Under a worst-case analysis, burial of soil materials at the mine/mill site and failure to salvage sufficient soil material for revegetation would result in revegetation failure on the tailings dam, tailings pond, and four waste disposal areas. Revegetation failure on this area (approximately 2,065 acres total) would indirectly result in a significant long-term reduction of the visual quality of the mine/mill area.

Water Resources

There would be an approximate requirement of 4,840 acre-feet of groundwater annually. This represents an average groundwater demand which would result in an approximate 34 percent reduction in natural groundwater flow beneath the Anaconda Copper Company property. The withdrawal would not affect other local users and no significant impacts are anticipated. However, projected decreases in groundwater underflow would be long term in the sense that the reduced discharge to the southern Tonopah Flat would not be felt for possibly hundreds of years.

Seepage of approximately 400 acre-feet per year of tailings liquid out of the tailings pond would occur, but available data indicate that water quality of the underlying aquifer would not be significantly affected.

Vegetation

The short-term use of the proposed project would remove an insignificant portion of the available regional rangeland base in the long term. Vegetation from 2,521 acres at the mine/mill complex and 87 acres of transmission line would be permanently removed from production; this would represent a long-term loss. The long-term productivity of the vegetation in the Big Smoky Valley would not be significantly changed by the project. Construction of the mine/mill complex could result in disturbance of candidate threatened and endangered plants. If this did result, the loss or removal of the plants from their natural habitat would represent a significant long-term impact.

Wildlife

The impacts of the proposed project on wildlife (temporary and permanent loss of wildlife habitat) would not affect the long-term productivity of the wildlife resources. Significant wildlife species or habitats would not be adversely affected.

Cultural Resources

The Proposed Action would impact the integrity of cultural resources sites (approximately eleven) for the short term. The affected cultural sites would be salvaged and the characteristics of the sites would be recorded for the interpretation and understanding of future generations. The increased population associated with the development of the mine/mill complex would also indirectly impact the nearby Liberty and Blue Jack mines for the short term. The short-term impacts on these historical sites would affect the historical resources of the Big Smoky Valley over the long term.

Visual Resources

The short-term use of the project area for the mine/mill site would significantly change the visual character over the long term. The construction of the transmission line would represent a visual intrusion for those individuals in the Big Smoky Valley over the long term. However, the contrast values would be within the restrictions for BLM Visual Resource Classes.

Noise

Minor short-term effects on noise would result. However, these effects are considered insignificant and would not affect long-term productivity.

Recreation Resources

The significant increase in population in Tonopah would increase usage of limited recreation facilities causing severe capacity problems in the very short term. As financial resources become available in the early years of the project life, these problems would be substantially eliminated. Over the long term, assuming a population decline at the end of the project life, excess capacity would be available.

Land Use

Approximately 3,204 acres of land would be changed from open space and grazing uses to primarily residential and industrial uses. In the long term, approximately 419 acres would be returned to open space and grazing; 264 acres would remain in residential and ancillary use; and 2,521 acres would remain as the unreclaimed mine pit, waste disposal areas, and tailings area (assuming worst-case analysis). The project would indirectly double the developed acreage of Tonopah over the long term.

Grazing

The mine/mill complex would result in the long-term loss of 66 AUMs per year, assuming the worst case. The transmission line would result in the long-term loss of 3.2 AUMs per year. Neither of these losses would significantly affect the long-term productivity of Nye County or the Big Smoky Valley.

Mineral Resources

One hundred-fifty million metric tons of molybdenum and copper ore would be removed

from Nye County reserves in the short term. The molybdenum ore produced at the mine would benefit the nation in the short term by satisfying part of the nation's demand for this resource. It is not certain what effect changing technology and economic conditions would have on production of this resource in the long term if the proposed project were not implemented.

Transportation

In the short term, automobile traffic increases would significantly increase congestion on combined U.S. 95-6 northwest of Tonopah, State Route 89, and in Tonopah. Traffic accidents would increase proportionately. These effects would not continue into the long term.

Socioeconomic Conditions

There would be a dramatic temporary increase in population due to project start-up and a significant population decline at project abandonment. The effects of both would dissipate over the long term. Employment would follow a pattern similar to population.

Wage-price pressures resulting from the rapid employment growth and relatively high wage levels associated with the proposed project could dichotomize the income structure to a degree that the impacts would continue into the long term.

The project would beneficially affect the regional income for the project area. The project would generate an annual payroll of $8 million and a construction payroll of $26 million.

Public finance would be temporarily affected by rapid increase and subsequent decrease of the tax base. The long-term impact would be negligible.

Any disruption of lifestyles or friction among social groups would occur in the initial years of the project, while long-term social accommodation would likely occur among groups.

High demand would generate a large investment in housing. An immediate shortfall of approximately 753 units during construction would occur. An over-supply could result in the long term following project abandonment, depending on the type and durability of the housing produced.

Capital intensive facilities such as schools and water and wastewater facilities would face excess temporary demand. In the long term as capacity is increased, they would experience excess capacity conditions. Less capital intensive facilities or services such as law enforcement services and fire protection services are more adaptable and could more readily reduce service levels in the long term to efficiently serve the population level at that time.

Summary

There are major trade-offs associated with the implementation of the Proposed Action. Essentially, the Proposed Action would consist of providing power to the Anaconda Nevada Moly mine which would result in the processing of 150 million tons of molybdenum ore which would help supply the nation's short-term molybdenum needs. In addition, the project would significantly increase population and raise the regional economy of Nye County and especially the town of Tonopah.

Associated with the short-term beneficial effects of the project would also be short-term adverse effects which could affect the maintenance and enhancement of the long-term productivity. Some of the short-term effects would be associated with increased demand for recreation resources, change of land use, and increase in traffic and accident rates. Over the life of the mine/mill complex, the population in Nye County is expected to increase by approximately 4,275 persons due to the Proposed Action. During the first two or three years of the project there would be some temporary adverse effects because of the local economy's inability to respond fully to the pressures associated with the large influx of people into an area. Therefore, there would be increased demand for public services, which could create temporary fiscal impacts and result in short-term reductions in the level of service provided. However, in the long term, the increased revenues, especially from property taxes, would not only offset the additional expenditures burden created by the project, but would generate sufficient revenues to either support other programs or reduce the tax burden.

There would be long-term reductions in the visual quality of the landscape around the mine/mill.

Irreversible and Irretrievable Commitments of Resources

This section identifies the irreversible and irretrievable commitments of resources resulting from the Proposed Action. The term irreversible is defined as use that is incapable of being reversed. Once something is initiated, it would continue. The term irretrievable means irrecoverable; once something is used it is not replaceable.

Geologic Setting

The geologic formations of the open pit mine would be irreversibly changed by the removal of waste rock and ore. The molybdenum and copper extracts produced by the mill, once shipped to market, would be irretrievable.

Topography

The changes in land forms due to excavation of the open pit mine, creation of the tailings dam, and build-up of the waste disposal areas are irreversible. While reclamation of previous land forms is technically possible, such a massive operation would be economically unfeasible.

Soils

Approximately 2,521 acres of soil would be covered during project operation and construction (by mine pit, waste disposal areas, tailings dam, and tailings pond). This soil would be irretrievably lost.

Water Resources

Mining, milling, and associated activities would irretrievably consume approximately 4,840 acre-feet of groundwater annually.

Vegetation

Construction of project facilities would involve removal of vegetation from 2,940 acres at the mine/mill complex, and 98 acres for the proposed transmission line. Under worst-case analyses, only 419 acres of the mine/mill complex and 11 acres of the transmission line would be revegetated.

Wildlife

Under the worst-case analysis the wildlife habitat represented by the mine pit, tailings area, and waste disposal areas would be irreversibly committed as a result of the mine/mill complex (2,521 acres). Similarly, the transmission line would involve an irreversible commitment of 87 acres of wildlife habitat.

Cultural Resources

Construction of the transmission line may result in the excavation of cultural resources as a salvage measure. The loss of the integrity of the site would be an irreversible and irretrievable commitment of resource.

Visual Resources

The proposed landforms associated with the mine/mill complex would cause changes which would be economically unreasonable to reverse. Once initiated, the new tailings dam, waste disposal areas, and mine pit would irreversibly change the visual character of the landscape.

Land Use

Under worst-case analysis, approximately 2,521 acres of land would be irreversibly committed at the mine/mill site and approximately 264 acres would be irreversibly committed for the housing and other demands requiring land development.

Minerals

Approximately 150 million tons of molybdenum ore would be processed. The molybdenum and copper products, once stripped, would be irretrievable.

Socioeconomic

Human resources and materials used to implement the Proposed Action are considered to be irretrievable. Energy, in the form of petroleum products and electricity, would be expended to obtain and process the ore. These resources would be considered irretrievable.

The population growth and the accompanying changes in social, economic, and lifestyle values would also constitute an irreversible and irretrievable commitment of resources. The amount of human effort directly and indirectly associated with the proposed project, accidental loss of life, and injuries are further commitments of resources which would be made.

Energy Requirements

A summary of the energy requirements for the Proposed Action and alternatives can be found in Table 1-5. The estimated average electric power requirements for the mine/mill complex are estimated at 30Mw. In addition, there would be a short-term fuel requirement of approximately 39,000 gallons of diesel fuel and gasoline to construct the transmission line, and a requirement of approximately 693,000 gallons of gasoline to transport the construction workers to the construction site during the construction period. The short-term fuel requirements would total 732,783 gallons. During operations, the annual fuel requirements for operation of the mine/mill and transportation of the employees would be approximately 2,813,500 gallons of diesel fuel and gasoline annually.

EFFECTS OF IMPLEMENTING ALTERNATIVE 1, WEST SMOKY VALLEY TRANSMISSION CORRIDOR

Alternative 1 differs from the Proposed Action only in that the 230kv transmission line would be located on the west side of the Big Smoky Valley, rather than the east. The alternative includes two options; location on either the west or east side of Highway 376. The length of the corridor would be increased to 91 miles and would require crossing some private lands (See Map 1-1). All aspects of the mine/mill complex would be identical to those described for the Proposed Action. Accordingly, all impacts for the mine/mill complex would occur as described in the discussion of impacts for the Proposed Action (pages 3-2 through 3-40); discussion of these impacts is not repeated below.

The following environmental components would not be significantly affected by implementing Alternative 1:

- Climate (see ERT Air Quality Technical Report 1980).
- Agriculture (see ERT Socioeconomics Technical Report 1980).
- Wilderness (see ERT Socioeconomics Technical Report 1980).

For the following components, implementation of Alternative 1 would result in impacts identical to those described for the Proposed Action:

- Air Quality (see page 3.2).
- Geologic Setting (see page 3.5).
- Topography (see page 3-6).
- Noise (see page 3-19).
- Recreation (see page 3-20).
- Livestock Grazing (see page 3-21).
- Mineral Resources (see page 3-21).
- Transportation (see page 3-21).
- Socioeconomics (see page 3-25).

The following discussions focus only on those components which would be differentially affected by implementing Alternative 1 and the Proposed Action. As in the discussion for the Proposed Action, all committed mitigation measures for the mine/mill complex have been incorporated into Chapter 1; several mitigation measures discussed below for the transmission line are in addition to those discussed in Chapter 1, have been committed by Sierra Pacific Power Company, and would be implemented if Alternative 1, West Smoky Valley transmission corridor, were chosen.

Soils

Impacts

As with the proposed route alignment, no significant impacts to soils would result from construction of the transmission line on the alternate route. Burial of soils would occur at the switching station and surface disturbance would occur at tower construction sites, along the access trail, and at the materials storage yard. These direct impacts are considered insignificant, however, because of the limited area of disturbance (103 acres over 91 linear miles) and the inclusion of committed, enforceable mitigation measures in Chapter 1 which minimize the amount of disturbance and require erosion control and revegetation measures to be implemented where necessary.

Unavoidable Adverse Impacts

Construction of the transmission line in the West Smoky Valley corridor would not cause any significant unavoidable adverse impacts to soils.

Water Resources

Impacts

No significant impacts to water resources would occur as a result of transmission line construction on the West Smoky Valley Alternative. As mentioned in Chapter 2, crossing of 7 perennial and 16 intermittent or ephemeral streams would be required. No significant impacts would be expected, however, because of the inclusion of enforceable mitigation measures in Chapter 1 which adequately protect water courses. In particular, the proximity of Highway 376 to the alternate alignment would allow use of the existing road at stream crossings and would significantly reduce the potential for impact.

Unavoidable Adverse Impacts

No significant unavoidable adverse impacts would result from construction of the transmission line on the West Smoky Valley Corridor.

Vegetation

Impacts

Construction of the transmission line in the West Smoky Valley alternative corridor would result in vegetation disturbance similar to that for the proposed transmission line. Impacts associated with the permanent loss of vegetative productivity on 92 acres (over 91 miles) and temporary loss on 11 acres would be insignificant because of the low productivity of the land

(27 acres per AUM) and the comparatively small area affected. Mitigation measures in Chapter 1 regarding candidate threatened and endangered plants would preclude adverse impacts tc these important species.

Unavoidable Adverse Impacts

No significant unavoidable adverse impacts would result from transmission line construction on the West Smoky Valley corridor.

Wildlife

Impacts

The West Smoky Valley Alternative would pose the same significant impacts to wildlife as the proposed corridor. The sage grouse strutting ground mentioned in the discussion for the Proposed Action (see page 3-15) is common to both alternatives (see Map 2-3). Because the exact location of the ground and adjacent nesting habitats is not known, the worst-case assumption is that nesting success would be significantly reduced by transmission line construction. This would be a significant impact, as discussed for the Proposed Action.

Additional impacts to wildlife would occur if the transmission line were constructed on the West Smoky Valley corridor, but these are considered insignificant. First, approximately 20 miles of mule deer winter range would be crossed. Based on the assumptions of an 8-foot wide access trail, an 800 square-foot area of disturbance at tower locations, and tower locations every 850 feet, approximately 22 acres of mule deer winter range would be disturbed over the 20 miles. This would be a reduction of less than one AUM within the range and is therefore considered insignificant. The transmission line would not present any barriers to mule deer movement.

The construction period (October through April) coincides with the period of use of the winter range and the presence of construction crews and activity would cause avoidance of adjacent areas. This would be insignificant because the crews would not be present all along the area at any one time, and the winter range extends over a much larger area on the flanks of the adjacent mountains.

The West Smoky Valley Alternative would cross several areas of aquatic-riparian habitat (see Map 2-3) which occur along streams in the corridor. Mitigation measures included in Chapter 1 preclude the placement of towers within 300 feet of the streams and would ensure the use of Highway 376 for the stream crossing, so no impact would occur. The same conclusion applies to fish habitats downstream of the crossing of Bowman and Kingston Creeks.

Mitigation Measures

In addition to the mitigation measures referenced from Chapter 1, measures would be taken to eliminate the significant impacts to sage grouse. As discussed for the Proposed Action the exact location of the strutting ground and nesting habitat would be determined, the impacts would be reevaluated by BLM and Nevada Department of Wildlife, and line relocation or tower modification would be implemented if necessary.

Unavoidable Adverse Impacts

Given the mitigation measure described above no significant unavoidable adverse impacts to wildlife would result from construction of the transmission line on the West Smoky Valley Alternative.

Visual Resources

Impacts

Impacts to visual resources of the West Smoky Valley Alternative would depend on whether the transmission line were constructed on the east side of Highway 376 or on the west side. Separate impact analyses were conducted for the two options because either side of the highway could potentially be selected.

Visual impact analyses for the east side of the highway were performed from a point along Highway 376 near the Alkali Flat. It was assumed that most people traveling Highway 376 direct their views to the scenic Toiyabe Mountains to the west. However, there is a stretch of Highway 376 (extending approximately 15 miles north of Carver's Junction) where the highway is directly in front of the Toiyabe Mountains and the view of the Toiyabe Mountains (Class II) is the same on the east side as well as on the west side of Highway 376. With the exception of the 15-mile stretch, a transmission line would be generally less visible on the east side of the highway than on the west. See Appendix D for comparative analysis of visual impacts associated with construction of the line on the east or west side of the highway.

As indicated in Chapter 2, the transmission line on the east side of the highway would cross approximately 23 miles of land classified as VRM Class III, 13 miles of land classified as VRM Class V and 55 miles of land classified as VRM Class IV (see Table 2-11 for definition of classes). The total contrast for transmission line structures would exceed VRM Class III restrictions and meet Class IV restrictions. Additional significant visual impacts would be caused by the transmission structures in the

area within 1.5 miles of Route 376; therefore, the visual impacts for the east side would be significant for the majority of the line. (ERT Visual Resources Technical Report 1980.)

The visual impact analyses for the west side option were performed from the intersection of Route 50 and the transmission line and from the parking area across the highway from Carver's Junction. Visual contrasts caused by the construction of the transmission line on the west side option would be very significant. The high level of significance is due to its location within the view from Routes 50, Highway 376, and the Carver's Junction area to the scenic Toiyabe Mountains. Although BLM Visual Resource Management guidelines require that allowable visual contrasts are dictated by the VRM class upon which the transmission line is built, it is clear that people generally look over the narrow VRM Class III area to the VRM Class II area (Toiyabe Mountains) to the immediate west. As such, the level of contrast influences an area in which development should not be evident or attract attention in the characteristic landscape.

The west side option would also cross approximately 36 miles of land classified as VRM Class III; 48 miles of land classified as VRM Class IV and 13 miles of land classified as VRM Class V (see Table 2-11 for definition of classes). The visual contrast impacts associated with the transmission line on the west side would exceed VRM Class III restrictions and would be within the allowable contrasts for VRM Class IV and V. The visual impacts which would be caused by the transmission structures in the area within 1.5 miles of Route 376 would be significant due to the discordance of colors. Therefore, the visual impacts for the majority of the line would be significant (ERT Visual Resources Technical Report 1980).

Construction of the transmission line would present a visual intrusion to persons in the immediate area. In addition, there would be significant visual impacts along Highway 376 in the Alkali Flat area and at the Route 50 crossing. The visual contrast impacts associated with the transmission line on the west and east side would exceed restrictions for VRM Class III, but would be within the allowable contrast for VRM Class IV, and Class V areas. In addition, the transmission line constructed in the west side corridor would be directly within the view of the Toiyabe Mountains (Class II) for a distance of approximately 60 miles. If the transmission line were constructed in the east side corridor, it would be directly within the view of the Toiyabe Mountains (Class II) for a distance of approximately 15 miles. Therefore, construction of the line in either corridor would significantly indirectly affect the VRM Class II area.

Unavoidable Adverse Impacts

For the West Smoky Valley Alternative, visual contrasts would result from the transmission line structures. If the line were constructed east or west of Highway 376, visual contrasts would be significant and exceed the BLM restrictions for existing Visual Resource Management Class III, and would also result in significant impacts in the area within 1.5 miles of route 376. In addition, construction of the transmission line in either the east or west corridor would adversely affect the Class II area directly to the west of the corridor and these indirect impacts would be considered significant.

Cultural Resources

Impacts

Prehistoric Sites Nineteen prehistoric archeological sites are located within the alternative corridor route (Table 2-9). Most of the sites are small single task activity areas. The sites located in the transmission line construction area would be directly affected by construction activities. However, this is not considered a significant adverse impact because the BLM Class III mitigation program described in Chapter 1 would adequately mitigate the adverse effects by surface collection, curation of specimens, and preparation of a report of the study, (ERT Cultural Resources Technical Report 1980). The integrity of the salvaged sites would be lost, but this is not considered a significant impact because the characteristics and history of the site would be recorded for the interpretation and understanding of future generations.

Three large settlements indicating extensive occupation are located near the alternative corridor. Additional analysis and testing is required to determine the extent and significance of the prehistoric sites (ERT Cultural Resources Technical Report 1980). Initial analysis indicates that these sites would be eligible for nomination to the National Register. Therefore, assuming the worst-case analysis based on present information, it is assumed that any direct or indirect impacts to these sites as a result of construction activity or increased visitation as a result of increased population would represent a significant adverse impact to information relevant to the prehistory of the Big Smoky Valley.

Historical Sites The Minnium Stage Station and Belmont-Austin Stage Coach Road are two

historical features located in or adjacent to the alternative corridor. The significance of these features has not been determined. However, assuming the worst-case analysis, it is assumed that any direct or indirect impacts to these sites would represent a significant adverse impact to the historical resources of the Big Smoky Valley.

Summary Based on information known to date and assuming worst-case analysis, the construction of the transmission line in the alternative corridor would represent a significant cumulative adverse impact to the prehistoric and historic resources of the Big Smoky Valley. In order to mitigate these adverse impacts and to preserve the integrity of known prehistoric and historic sites, the right-of-way would have to be moved farther up the alluvial slope to protect the sites after a Class III cultural resource survey has been completed. This additional mitigation measure would eliminate the adverse impacts cited.

Unavoidable Adverse Impacts

For the West Smoky Valley Alternative transmission line route, significant unavoidable adverse impacts would be associated with direct or indirect impacts to the three major prehistoric sites and two historic sites. The construction of the transmission line would represent a significant cumulative adverse impact to the prehistoric and historic resources of the Big Smoky Valley. Relocation of the transmission line alignment around these significant sites would preserve sites and eliminate the adverse impacts cited.

Land Use

Impacts

There would be a few instances along the West Smoky Valley alternative where the proposed transmission line would cross private land containing ranch buildings. For safety reasons, buildings would not be permitted within the right-of-way. However, it is assumed that in all cases there is sufficient space within the study corridor to safely avoid buildings; thus, the potential conflict is considered insignificant. Minor conflicts would occur with the enjoyment of the rural residential environment by ranch residents.

Unavoidable Adverse Impacts

No significant unavoidable adverse impacts to land use would result from construction of the transmission line on the West Smoky Valley alternative.

The Relationship Between Local Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

These relationships would be basically the same if the West Smoky Valley Alternative were implemented as if the Proposed Action were implemented (see page 3-40).

Irreversible and Irretrievable Commitments of Resources

These would be identical to those discussed for the Proposed Action (see page 3-42).

Energy Requirements

The energy requirements of this alternative would be identical to those discussed for the Proposed Action (see page 3-43).

EFFECTS OF IMPLEMENTING ALTERNATIVE 2, ALTERNATE TOWER STRUCTURES

Because the availability of the proposed transmission line structures (wood H-frame) could become limited prior to implementing the Proposed Action, Sierra Pacific Power Company requested that the effects of several alternate tower structures be analyzed. Four options were considered (refer to Figures 1-6 and 1-7):

- Option A - Wood K-frame tangent
- Option B - Aluminum guyed delta and 4-legged free standing tangent
- Option C - Concrete H-frame tangent
- Option D - Steel H-frame tangent

Each of these options was analyzed in relation to two possible transmission line corridors, the proposed corridor described in the Proposed Action and the West Smoky Valley corridor described as Alternative 1. Because the transmission line could be located on either side of Highway 376 if Alternative 2 were selected, effects of either alignment were analyzed.

For all environmental components, except visual resources, the use of any of the optionnal tower structures would not influence the impacts produced. The area of disturbance required for the several options does vary somewhat, as shown in Table 1-7, but the maximum difference between any of the structures is a 6 percent increase for the steel H-frame tangent over the proposed wood H-frame.

The following environmental components would not be affected by implementing Alternative 2:

- Climate (ERT Air Quality Technical Report 1980).
- Agriculture (ERT Socioeconomics Technical Report 1980).

- Wilderness (ERT Socioeconomics Technical Report 1980).

The following environmental components would be affected by implementing Alternative 2 in the same ways that they would be affected by implementation of the Proposed Action or Alternative 1 (depending on transmission line location):

- Air Quality (see page 3-2).
- Geologic Setting (see page 3-5).
- Topography (see page 3-6).
- Soils (see page 3-6).
- Water Resources (see page 3-10).
- Vegetation (see page 3-13).
- Wildlife (see page 3-15).
- Cultural Resources (see page 3-17).
- Noise (see page 3-19).
- Recreation (see page 3-20).
- Land Use and Land Use Controls (see page 3-20).
- Livestock Grazing (see page 3-21).
- Mineral Resources (see page 3-21).
- Transportation (see page 3-21).
- Socioeconomics (see page 3-25).

Visual Resources

Impacts

Figures D-2 through D-6 in Appendix D, summarize the visual impacts of the various alternate transmission line structures on all possible corridor alignments. In general, options B, C, and D would pose less severe visual contrasts because their colors would be in greater harmony with the natural tans and grays of the existing landscape. The dark color of the treated wood poles used for the proposed structures and for option A would strongly contrast with the existing colors in the landscape.

For the proposed corridor, visual contrast ratings for all of the options fall at or below restrictions for Class IV and V Visual Resource Management (VRM) Classes. Option A, the wood K-frame would have identical effects as the proposed wood H-frame structure, and similar mitigation measures would be needed to reduce strong contrast ratings resulting from the discordant color of the dark brown poles.

For the West Smoky Valley Alternative corridor, assuming line location on the west side of Highway 376, all of the options would exceed BLM restrictions for Class III areas. In addition, all of the options would be located directly within the view of the scenic Toiyabe Mountains (Class II) to the west, and thus would result in very significant impacts to visual resources.

For the West Smoky Valley Alternative corridor, assuming line location on the east side of the highway, the wood K-frame structure would exceed VRM Class III contrast restrictions. The remaining options would cause visual contrasts which meet VRM Class III restrictions. Again, as discussed for the proposed structures on the West Smoky Valley Alternative corridor, the line would be directly in the view of the Toiyabe Mountains (Class II) for a distance of approximately 15 miles. Construction of the line in this corridor using any options, including the proposed structures, would significantly indirectly affect the VRM Class II area.

Unavoidable Adverse Impacts

Unavoidable adverse impacts which would be caused by using the alternate transmission line structures vary with the structure and with the location of the transmission line corridor. All options would result in some visual contrasts due to introduction of the structures into the landscape. None of the options would exceed VRM Class restrictions of the proposed corridor, although the dark colors of the wood K-frame would pose strong contrasts which would be considered significant. All of the options would exceed VRM Class restrictions on the West Smoky Valley Alternative corridor (west side of highway) and would significantly interfere with the view of the scenic Toiyabe Mountains. Three of the four options would meet VRM Class restrictions on the east side of Highway 376 and the fourth would exceed the restrictions; all of the options would still significantly interfere with the view of the Toiyabe Mountains in a 15 mile segment extending north from Carver's Junction.

The Relationship Between Local Short-Term Uses of Man's Environment and the Maintenance and Enhancement of the Long-Term Productivity

These relationships for Alternative 2 are identical to those described for the Proposed Action (see page 3-40).

Irreversible and Irretrievable Commitments of Resources

These are identical to the Proposed Action (see page 3-42).

Energy Requirements

These are identical to the Proposed Action (see page 3-43).

EFFECTS OF IMPLEMENTING ALTERNATIVE 3, ALTERNATIVE CRUSHING/GRINDING CIRCUIT FOR MINE/MILL COMPLEX

Alternative 3 differs from the Proposed Action in that a different crushing/grinding circuit would be utilized for the mine/mill complex.

Refer to Chapter 1 for a description of the alternative grinding circuit and comparison with the proposed grinding circuit.

The following environmental components would not be affected by implementing Alternative 3:

- Climate (ERT Air Quality Technical Report 1980).
- Agriculture (ERT Socioeconomics Technical Report 1980)
- Wilderness (ERT Socioeconomics Technical Report 1980).

The following environmental components would be affected by Alternative 3 in exactly the same way as they would be affected by the Proposed Action:

- Geologic Setting (see page 3-5).
- Topography (see page 3-6).
- Soils (see page 3-6).
- Water Resources (see page 3-10).
- Vegetation (see page 3-13).
- Wildlife (see page3-15).
- Cultural Resources (see page 3-17).
- Visual Resources (see page 3-18).
- Noise (see page 3-19).
- Recreation (see page 3-20).
- Land Use and Land Use Controls (see page 3-20).
- Livestock Grazing (see page 3-21).
- Mineral Resources (see page 3-21).
- Transportation (see page 3-21).

The following discussions focus only on those components which would be differentially affected by implementing Alternative 3 and the Proposed Action.

Air Quality

Specific Assumptions and Analysis Guidelines

Refer to assumptions and analysis guidelines for air quality associated with the Proposed Action.

Impacts

As indicated in Chapter 1, (Table 1-3) the total suspended particulate (TSP) emissions associated with the alternative would be identical to the Proposed Action with the exception of the emissions associated with the concentrator. Particulate emissions would be greater because of additional grinding and fine ore storage requirements. The particulate emissions from the operation of the mine/mill complex are direct impacts. Annual emissions for the concentrator were calculated to be 70 tons per year, and the maximum emission rate for a 24-hour period was calculated at 19.8 pounds per hour. This would increase the total TSP emissions from 1,600.5 to 1,655.4 tons per year. (ERT Air Quality Technical Report 1980).

The fugitive dust emissions from the mine/mill complex were not considered significant for the reasons described in the Proposed Action section of this chapter. Annual average TSP concentrations resulting from the industrial process emission rates were calculated by the model as a highest value of 5.9 micrograms per cubic meter ($\mu g/m^3$). This is well below the maximum allowable PSD increment of 19 $\mu g/m^3$ for annual average concentrations (Figure 3-4). In addition, when added to the annual geometric mean TSP concentration currently measured at the site of 16.1 $\mu g/m^3$, the maximum impact is still well below the National Ambient Air Quality Standards (NAAQS) of 60 $\mu g/m^3$ (ERT Air Quality Technical Report 1980).

Maximum 24-hour concentrations were predicted to occur for both south-southwesterly and north-northwesterly wind directions and resulted in a concentration of 31.4 $\mu g/m^3$. This value is below the 24-hour Prevention of Significant Deterioration (PSD) increment of 37 $\mu g/m^3$. It is not correct to add this prediction to the highest measured TSP concentrations to determine compliance with the NAAQS because high measured TSP concentrations result during high wind speeds, while the maximum impact predictions are for low wind speeds. For this reasons, this alternative would not result in concentrations which exceed the 24-hour NAAQS.

Unavoidable Adverse Impacts

Construction and operation of the mine/mill complex would result in a direct impact of particulate emissions of approximately 1,655.4 tons per year. This is considered an insignificant impact because the estimated annual average and maximum 24-hour TSP concentration associated with the industrial process were modeled and would be well below the PSD increment and the NAAQS. Based on the accepted PSD and NAAQS criteria, this alternative would not significantly affect air quality.

Socioeconomics

Impacts

As indicated in Chapter 1, this alternative would require an additional 18 employees. As a result of the new employees, the population would be indirectly increased by 101. This would result in a total population increase of 2,291 for Nye County and 2,171 for Tonopah. This would represent a 5 percent increase in population above the population level associ-

ated with the Proposed Action. When compared with the baseline population, the total population increase of this alternative is significant. The increased population would create an additional housing demand for 33 dwelling units. The adverse impacts associated with this increase in housing demand would also contribute to the significant housing impacts previously described for the Proposed Action. This could increase the shortfall of housing units from approximately 753 to 786 units. The impacts of the shortfall would add to the significant impacts identified for the Proposed Action.

Unavoidable Adverse Impacts

This alternative would result in a direct population increase of 101 and create an additional housing demand for 33 dwelling units over the Proposed Action. Total population increases with this alternative would be 2,291 for Nye County and 2,171 for Tonopah. The increase in population would also provide pressure to other community facilities and services that are presently or would be at capacity in the future.

Relationship Between Local Short-Term Uses of the Environment and the Enhancement of Long-Term Productivity

The definition of short term and long term would be the same as identified for the Proposed Action. The discussion of short-term uses and enhancement of long-term productivity for this alternative would be similar to the same discussion for the Proposed Action (see pages 3-40 through 3-42). The only major differences between the Proposed Action and this alternative would relate to an insignificant increase in particulate and pollutant emissions, an increase in population in Tonopah and Nye County, and an associated demand for 33 additional dwelling units.

Irreversible and Irretrievable Commitment of Resources

The definitions for irreversible and irretrievable are the same as identified for the Proposed Action (see pages 3-42 through 3-43). The discussion of irreversible and irretrievable commitments resources for this alternative would be similar to the same discussion for the Proposed Action. The only major differences between the Proposed Action and this alternative would relate to a commitment of additional manpower resources.

Energy Requirements

The energy requirements for this alternative would be the same as the Proposed Action except that the electrical requirements would be 27.9 MW which is 7 percent less than the Proposed Action.

EFFECTS OF IMPLEMENTING ALTERNATIVE 4, NO ACTION

Alternative 4 differs from the Proposed Action in that it is assumed that the right-of-way permit would be denied. The transmission line would not be constructed and Anaconda would develop on-site generation facilities using diesel generators (refer to Chapter 1 for description of the No Action Alternative). Accordingly, all impacts for the mine/mill complex would occur as described in the discussion of impacts for the Proposed Action.

The following environmental components would not be significantly affected by implementing Alternative 4:

- Climate (ERT Air Quality Technical Report 1980).
- Agriculture (ERT Socioeconomics Technical Report 1980).
- Wilderness (ERT Socioeconomics Technical Report 1980).

Implementation of Alternative 4 would result in impacts on the following components identical to those described for the Proposed Action:

- Geologic Setting (see page 3-5).
- Topography (see pages 3-6).
- Recreation Resources (see page 3-20).
- Land Use and Land Use Controls (see page 3-20).
- Livestock Grazing (see page 3-21).
- Mineral Resources (see page 3-21).

Because the No Action Alternative does not include construction of the transmission line, the impacts associated with the transmission line in the Proposed Action would not be applicable to this alternative. Therefore, transmission line impacts identified in the Proposed Action for soils (page 3-6), water resources (page 3-10), vegetation (page 3-13), wildlife (page 3-15), visual resources (page 3-18), and cultural resources (page 3-17) would not occur under this alternative.

The following discussions focus on those components which would be differentially affected by implementing Alternative 4 and the Proposed Action. Mitigation measures previously identified for the mine/mill complex have been incorporated into the Proposed Action chapter. There would be no new mitigation measures associated with this alternative.

Air Quality

Specific Assumptions and Analysis Guidelines

Refer to Specific Assumptions and Analysis Guidelines for the Proposed Action (page 3-49) for assumptions for modeling and regulatory criteria for total suspended particulates (TSP).

The No Action Alternative consists of generation of power by on-site diesel generators. A total of 24 megawatts (Mw) would be provided by six 4-Mw units which would be installed if this option were to be selected. The units would burn ordinary diesel fuel. It is estimated that such units are capable of converting 38 percent of the input diesel fuel energy into power (Perry 1963). Thus, to generate 24Mw, it would be necessary to utilize 216 x 10^6 Btu/hour (British Thermal Units per hour) of fuel energy (approximately 12,000 pounds of diesel fuel per hour).

The exhaust gases from thse units would be vented to the atmosphere from six closely spaced stacks approximately 40 feet high. The exhaust gases would contain a certain amount of waste heat from the combustion. It is estimated that roughly 30 percent of the input heat is released with the exhaust gases (Perry 1963). Thus, each stack would emit roughly 10.8 x 10^6 Btu/hour of heat.

The generators are expected to emit quantities of four major pollutants: sulfur dioxide (SO_2), oxides of nitrogen (NO_x), carbon monoxide (CO), and particulate matter. The emission rate of each of these pollutants has been estimated using emission factors described in Table 1-8. The applicable state and Federal standards are also shown. It will be noted that both an annual-average emission rate and a maximum short-term emission rate has been specified. This is necessary since air quality standards exist for both short-term concentrations and annual-average concentrations.

The plume rise calculation used by the model is that of Briggs (1970). It requires only the specification of the amount of heat imparted to the exhaust gases to calculate the plume rise. The heat value has been assumed to be equivalent to the heat from one of the stacks (10.8 x 10^6 Btu/hour). This is a conservative assumption in that it would produce a lower plume rise and thus higher ground-level concentrations than if all six stacks were combined to give an "effective" heat rate.

Impacts

Air quality emissions associated with the mine/mill complex would be identical to those described for the Proposed Action except for the emissions associated with the generators. The particulate emissions from the operation of mine/mill complex and generators are direct impacts. The generators would result in an increase in particulate emissions of 55.6 tons per year (Table 1-3). This would increase the project-related particulate emissions from 1,600.5 to 1,656.1 tons per year.

Annual average TSP concentrations resulting from the generator were calculated by the models as a highest value of 0.1 micrograms per cubic meter ($\mu g/m^3$). This would increase the annual TSP value for the mine/mill complex to 1.5 $\mu g/m^3$. This is well below the maximum allowable Prevention of Significant Deterioration (PSD) increment of 19 $\mu g/m^3$ for annual average concentrations (Figure 3-5). Additionally, when added to the annual geometric mean TSP concentrations currently measured at the site, the maximum impact of 17.6 is still well below the National Ambient Air Quality Standards (NAAQS) of 60 $\mu g/m^3$ (ERT Air Quality Technical Report 1980).

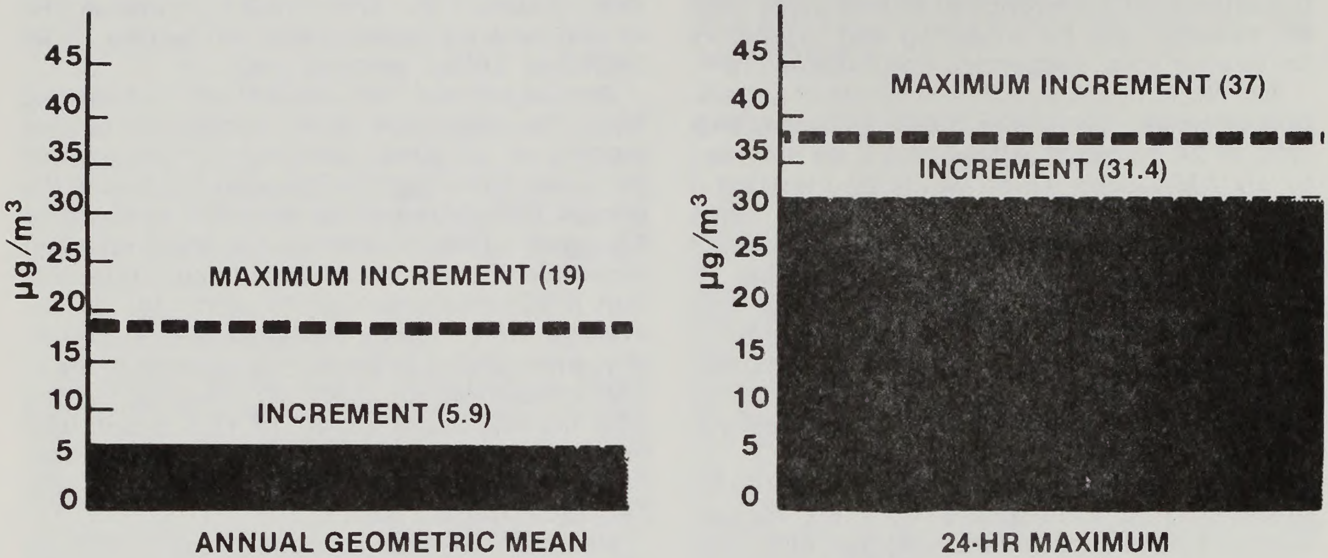
Maximum 24-hour concentrations of TSP for the generators were predicted for the worst case and resulted in a concentration of 7.3 $\mu g/m^3$. This value when added to the value for other sources at the mine site totals 14.1 $\mu g/m^3$, which is well below the 24-hour PSD increment of 37 $\mu g/m^3$. Therefore, this alternative would result in TSP concentrations which would not exceed the 24-hour NAAQS and PSD increment.

The generators would emit significant quantities of three major pollutants. The annual emission rates (tons/year) for CO, NO_x, and SO_2 are estimated to be 446.5, 3,204.4, and 519, respectively (ERT Air Quality Technical Report 1980). The concentration rates associated with the generators were modeled and the predicted rates for SO_2, CO, and NO_2 are shown in Table 3-13. Because of the remote location of the site and the absence of other industry in the area, the background concentration for SO_2, NO_x and CO_2 were all considered zero. While there would be a direct impact due to pollutant emissions from the generators, Table 3-13 indicates that no Federal or state standards of PSD increments would be exceeded for any of the pollutants (ERT Air Quality Technical Report 1980). Therefore, the impacts are considered insignificant.

Unavoidable Adverse Impacts

Construction and operation of the mine/mill complex and generators would result in a direct impact of particulate emissions of 1,656.1 tons per year, but this impact is not considered significant. The estimated annual-average and maximum 24-hour TSP concentrations associ-

PSD MAXIMUM ALLOWABLE INCREMENT



MAXIMUM ALLOWABLE TOTAL CONCENTRATIONS

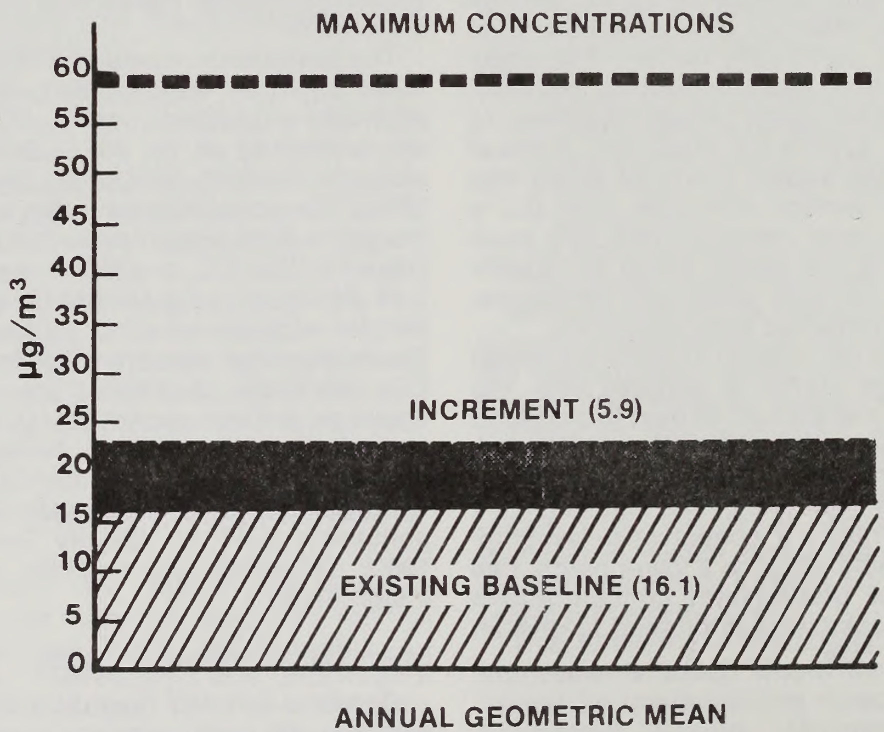


Figure 3-4. Comparison of Predicted Particulate Emissions and Concentration with Air Quality Standards (Alternative 3).

TABLE 3-13

COMPARISON OF FEDERAL AND STATE STANDARDS AND PSD INCREMENTS WITH MODEL PREDICTIONS ($\mu g/m^3$) (NO ACTION ALTERNATIVE)

Pollutant	Averaging Time	Federal Standards Primary	Federal Standards Secondary	State Standards	PSD Increments	Model Predictions	Background	Other Project Components	Total
SO_2	Annual	80		60	220	1.1	0	0	1.1
	24-hr	365		260	91	68.7[2]	0	0	68.7
	3-hr	-	1,300	1,300	512	151	0	0	151
TSP	Annual	75	60	60	19	0.1	16.1[3]	1.4	17.6
	24-hr	260	150	150	37	2.9[4]	16.1[3]	6.8	25.8
CO	8-hr	10,000	-	6,670[1]	-	129	0	0	129
	1-hr	4,000	-	40,000	-	129	0	0	129
NO_2	Annual	100	-	100	-	7.1[5]	0	0	7.1

[1]Above 5,000 ft elevation.
[2]Resulted from worst case.
[3]Since worst case for modeling is not necessarily worst-case background, Annual average is assumed here.
[4]Refer to ERT Air Quality Technical Report (1980) for additional information on modeling approach and prediction.
[5]Assumes all the NO_x is NO_2.

ated with the industrial process were modeled and concentrations were well below the PSD increment and the NAAQS. There would also be emissions of carbon monoxide, sulfur dioxide, and nitrogen oxide with the generators, but these concentrations do not violate any state or Federal air quality standards and are considered insignificant.

Noise

The noise impacts associated with the mine/mill complex would be identical to those described for the Proposed Action except for the noise associated with the generator. Based upon measurements of similar units, it is estimated that the noise level 50 feet from a single unit would be a maximum of 80 decibels A-weighted (dBA), and at a distance of 1,000 feet from all six units the total noise level would be approximately 60 dBA. These levels and the presence of other generally noisier mill area activities noted in the discussion of impacts for the Proposed Action, plus the remoteness of the mill from noise sensitive receptors, result in no significant increases in noise levels associated with this alternative.

Unavoidable Adverse Impacts

There would be additional noise sources as a result of operation of the generator. However, the noise levels from the generator would range from 60 to 80 dBA and are not considered significant in comparison with other noise levels associated with the mine/mill complex, especially considering the remoteness of the mill from sensitive noise receptors.

Transportation

Impacts

In addition to the vehicle use at the project site which was identified in Chapter 1, there would be three additional trucks each week to supply diesel fuel and bring supplies to the project site. As indicated under the Proposed Action discussion, the Proposed Action would result in significant temporary and long-term transportation impacts. The increased vehicle use associated with this alternative would not substantially increase those impacts.

Unavoidable Adverse Impacts

The No Action Alternative would require an additional three trucks each week to supply diesel fuel and bring supplies to the site. This would add to the significant transportation impacts identified for the Proposed Action.

Socioeconomic

As indicated in Chapter 1, if the No Action Alternative were implemented, Anaconda would be faced with a decision to terminate the project or proceed with on-site generation facilities. This alternative assumes that they would proceed. However, if they would not proceed and the project were abandoned, all of the beneficial and adverse socioeconomic impacts identified for the Proposed Action would be foregone. Some of the general beneficial and adverse socioeconomic impacts which would be foregone if the Nevada Moly Project would not proceed are shown in Table 1-10.

Assuming that the project would proceed, there would be one major difference in socioeconomic impacts between the Proposed Action and the No Action Alternative. The self-generation facilities would require 10 to 15 additional employees. As a result of the new employees, the population would be increased by 86. This would result in a total population increase of 2,277 for Nye County and 2,157 for Tonopah. This would represent a 3.7 percent increase in population over that associated with the Proposed Action and when compared with the increase associated with the Proposed Action, is insignificant. When compared with the baseline population, the total population increase of this alternative is significant and population impacts would add to the significant population impacts described for the Proposed Action. The increased population would create an additional housing demand for 28 dwelling units. This would increase the shortfall from 753 units to 781 units. The impacts of the shortfall would add to the significant impacts identified for the Proposed Action.

Unavoidable Adverse Impacts

This alternative would result in a population increase of 86 and create an additional housing demand for 28 dwelling units over levels specified for the Proposed Action. The increase in population would also provide pressure to other community facilities and services that are presently or would be at capacity in the near future.

Relationship Between Local Short-Term Uses of the Environment and the Enhancement of Long-Term Productivity

The definition of short term and long term would be the same as identified for the Proposed Action (see page 3-40). The discussion of short-term uses and enhancement of long-term productivity for the No Action Alternative would be similar to the same discussion for the Proposed Action. The only major differences between the Proposed Action and the No Action Alternative would relate to an increase in particulate emissions; increases in population with additional demand for 28 dwelling units; and a substantial diesel fuel requirement.

Irreversible and Irretrievable Commitment of Resources

The definitions for irreversible and irretrievable are the same as identified for the Proposed Action (see page 3-42). The discussion of irreversible and irretrievable resources for the No Action Alternative would be similar to the same discussion for the Proposed Action. The only major differences between the Proposed Action and No Action Alternative would relate to commitment of additional manpower resources and a commitment of diesel fuel throughout the project life.

Energy Requirements

The energy requirements for the No Action Alternative would differ primarily due to the elimination of the electrical power requirement and the addition of the diesel fuel requirements for the generators (Table 1-5). An additional 6,570,000 gallons of diesel fuel would be required annually for the generators. Over the long term, the annual fuel requirements for operation of the mine/mill and the transportation of employees would be approximately 9,383,500 gallons. This is approximately three times the fuel requirement for the Proposed Action.

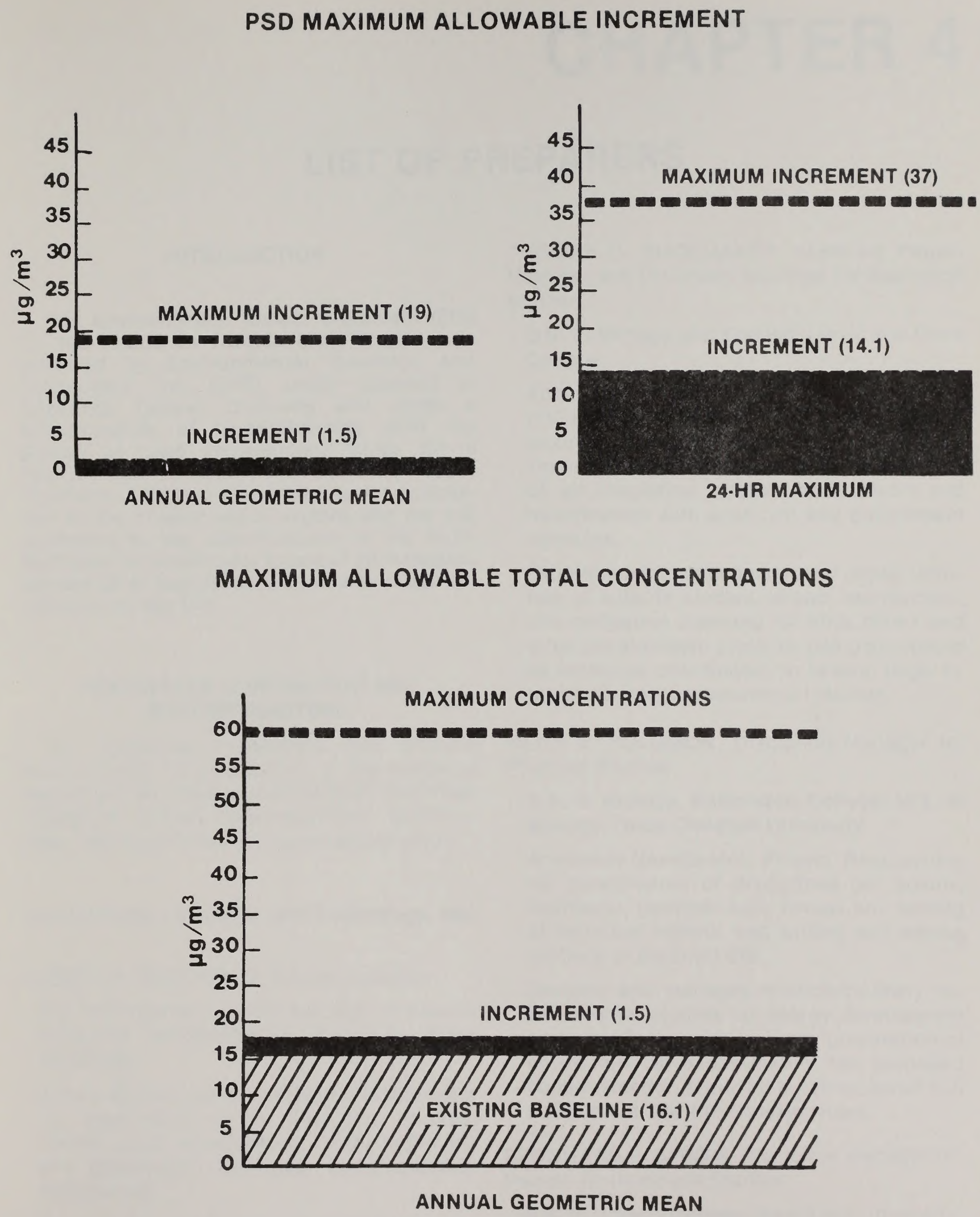


Figure 3-5. Comparison of Predicted Particulate Emissions and Concentration with Air Quality Standards (No Action Alternative).

CHAPTER 4

LIST OF PREPARERS

INTRODUCTION

This Environmental Impact Statement (EIS) for the Anaconda Nevada Moly Project was prepared by Environmental Research and Technology, Inc. (ERT), under contract to Anaconda Copper Company and under a Memorandum of Understanding with the Bureau of Land Management (BLM), Sierra Pacific Power Company, and Anaconda Copper Company. ERT had responsibility for completion of the environmental studies and the EIS according to the specifications of the BLM. BLM was responsible for review of all materials, assurance of quality control, and eventual acceptance of the EIS.

DESIGNATED CONTRACTOR AND SUBCONTRACTORS

The following individuals had primary responsibility for preparation of the technical reports and development of the Draft EIS. Their education, project responsibilities, qualifications, and experience are summarized below.

Environmental Research and Technology, Inc.

ROBERT A. MCDONALD, Project Manager

B.S. in Fisheries Science and M.S. in Natural Resource Administration, Colorado State University

Anaconda Nevada Moly Project: Responsible for supervision of all discipline studies, liaison and coordination with applicant and government agencies, and regulatory compliance.

Experience includes management and preparation of several large, multidisciplinary environmental assessments and EISs for transportation, mine/mill, and power plant/reservoir projects.

THOMAS G. SHOEMAKER, Assistant Project Manager and Discipline Manager for Biological Studies

B.S. in Biology and English, Lewis and Clark College

Anaconda Nevada Moly Project: Supervised preparation of wildlife, vegetation, and soils technical reports; senior author of Wildlife Technical Report; assisted in supervision of all discipline studies and liaison and coordination with applicant and government agencies.

Experience includes design and implementation of wildlife studies, impact assessment, and mitigation planning for strip mines and other development projects; has participated as technical coordinator on several large interdisciplinary environmental studies.

DEHN E. SOLOMON, Discipline Manager for Physical Studies

B.A. in Biology, Kalamazoo College; M.S. in Biology, Texas Christian University

Anaconda Nevada Moly Project: Responsible for coordination of disciplines (air quality, hydrology, geotechnical), review and editing of technical reports, and writing and editing portions of the Draft EIS.

Designs and manages multidisciplinary environmental studies for energy development projects. Experience includes preparation of environmental assessments for proposed copper smelter, crude oil pipeline, fossil fuel power plant, and transmission lines.

BERNHARD E. STROM, Discipline Manager for Human Environment Studies

B.S. in Urban Planning, Iowa State University; M.C.R.P. in City and Regional Planning, Harvard University

Anaconda Nevada Moly Project: Responsible for coordination of human resources disci-

plines (visual resources, noise, land use, transportation, and socioeconomics), review and editing of technical reports, and writing and editing portions of the Draft EIS.

Experience includes conducting and managing human resources environmental assessments for energy and mineral development projects, pipelines, transmission lines, and transportation projects.

SOPHIE SAWYER, Technical Coordinator

B.A. in Biology and M.Ed. in Science Education, East Carolina University

Anaconda Nevada Moly Project: Assisted in coordination and compilation of technical reports and EIS.

Experience includes editorial review and compilation of environmental reports; revision of regional handbook for use in habitat evaluation by U.S. Fish and Wildlife Service.

ANDREW C. LUDWIG, Terrestrial Ecologist

B.S. in Zoology; M.S. in Zoology; M.S. in Resource Planning and Conservation, University of Michigan

Anaconda Nevada Moly Project: Technical writing and review in the preparation of the Draft EIS.

Experience includes serving as project manager and technical coordinator on several environmental assessments and EISs for the BLM and the Corps of Engineers. Has also worked on numerous corridor studies for high voltage transmission lines, pipelines, and railroads.

VALERIE J. RANDALL, Project Coordiator

B.A. in Urban Studies, Briarcliff College; Minor in Geography-Cartography

Anaconda Nevada Moly Project: Participated in preparation of sections of the EIS, including disciplines in the human environment.

Experience includes participation in cultural resource studies for pipelines and mine/mill projects; responsibility for coordination and preparation of elements of environmental reports.

STEPHEN G. LONG, Reclamation Biologist

B.S. in Wildlife Biology; M.S. in Regional Resource Planning with emphasis in Soil Science/Reclamation, Colorado State University

Anaconda Nevada Moly Project: Responsible for preparation of the soils portion of the EIS and revegetation plan. Senior author of Soils Technical Report.

Experience includes preparation of reclamation plans for surface mines, pipelines, and power plants; soil characteristics and analysis studies.

JEFFREY C. HOWRY, Anthropologist for Cultural Resources

B.A. in Anthropology, Adelphi University; M.A. in Social Anthropology/Archeology, Peabody Museum, Harvard University; Ph.D. in Anthropology, Harvard University

Anaconda Nevada Moly Project: Supervised and coordinated field investigations by Nevada State Museum; conducted historic archival research; prepared Cultural Resources Technical Report and relevant section of EIS.

Experience includes identification of historical, archeological, architectural, and other important cultural resources; direction of and participation in cultural resource field investigations; prediction of potential existing resources occurring in study areas; preparation of assessments with respect to the impact of a proposed development, and the making of recommendations for possible mitigative measures.

ELLEN I. COLLINS, Plant Ecologist

M.S. in Botany, Oklahoma State University; B.A. in Biology, Gettysburg College

Anaconda Nevada Moly Project: Responsible for environmental studies of vegetation, threatened and endangered species, and range management for the transmission line phase of the project. Junior author of Vegetation Technical Report.

Experience includes participation in vegetation baseline studies for proposed surface mining projects, pipelines, and transmission lines; conducting surveys for threatened or endangered plant species at proposed surface and underground mine sites and along proposed transmission and pipeline corridors; preparation of vegetation baseline reports, environmental assessments and EISs.

SCOTT L. ELLIS, Plant/Range Ecologist

B.A. in Biology and English, Cornell University

Anaconda Nevada Moly Project: Responsible for environmental studies of vegetation, threatened and endangered species, and range management. Senior author of Vegetation Technical Report.

Experience includes design and management of vegetation surveys and reclamation plans for proposed surface and underground mining projects and pipelines; development of publication describing threatened and endangered plant species in Colorado for the U.S. Fish and Wildlife Service; design and performance of surveys for threatened and endangered plant species at proposed industrial sites and along proposed transmission/pipeline corridors.

RICHARD SPOTTS, Hydrologist

B.S. in Civil Engineering, Colorado State University

Anaconda Nevada Moly Project: Responsible for data compilation and for coordination of the technical report for the water resources discipline.

Experience includes collection, compilation and analysis of hydrology data, including flood hazards, in preparation for writing environmental reports and mining plans; monitoring system design and field installation of both surface and groundwater networks.

ROBERT M. EARSY, Noise Engineer

B.S. in Electrical Engineering, University of Connecticut; M.S. in Electrical Engineering, Northeastern University; M.C.P. in City Planning, Harvard University; Registered professional engineer, Massachusetts.

Anaconda Nevada Moly Project: Responsible for environmental study of noise. Author of Noise Technical Report.

Experience includes design and supervision of noise measurement, prediction, and abatement studies. Has participated as an expert witness in public hearings related to environmental acoustics.

KARL ZELLER, Meteorologist

B.S. in Civil Engineering, Virginia Military Institute; M.S. in Meteorology, University of Utah; and Certified Consulting Meteorologists (CCM) accreditation

Anaconda Nevada Moly Project: Responsible for coordinaton of climatology and air quality impact input to project report and EIS. Senior author of the Air Quality Technical Report.

Experience includes research meteorologist for the Environmental Protection Agency (EPA) in support of all aspects of air pollution meteorology; support in establishing EPA's UNAMAP series of air quality dispersion models; air resource manager for BLM, responsible for establishing an air program within the BLM; regional air quality manager for ERT, responsible for ERT air study projects in the Rocky Mountain West.

RICHARD J. DEFIEUX, Geologist/ Hydrogeologist

B.A. in Geology; M.A. in Geology, Boston University

Anaconda Nevada Moly Project; Responsible for environmental studies related to geology and groundwater. Senior author of Geology and Groundwater Technical Report.

Experience includes management and performance of geological and hydrological investigations in support of EIS policy studies and solid waste/groundwater contamination studies; preparation of geology components of Federal EISs for proposed oil shale and gold mining projects.

BARBARA K. BUCKLEY, Geologist

B.S. in Geology, Tufts University

Anaconda Nevada Moly Project: Responsible for compilation and review of available geotechnical data and preparation of baseline descriptions.

Experience includes participation in multidisciplinary environmental impact studies, feasibility studies related to mine disposal of solid waste, and solid waste permitting investigations.

JAMES K. BURRELL, Soil Scientist

B.S. in Forest Management, Colorado State University

Anaconda Nevada Moly Project: Responsible for detailed soil survey of the proposed mine/mill complex.

Experience includes classification, mapping, and interpretation of analytical soil data for incorporation into mine plans, reclamation plans, and environmental assessments for projects in several western states.

WILLIAM H. HILTON, Soil Scientist

B.S. in Environmental Science, Grand Valley State College (Michigan)

Anaconda Nevada Moly Project: assisted in completion of detailed soil survey of the proposed mine/mill complex.

Experience includes mapping and classification of soils for a county soil survey in

Michigan as well as for several mining projects in the western United States.

STEVEN R. VIERT, Wildlife/Range Biologist

B.S. in Wildlife Management, University of Michigan; M.S. in Range/Ecology, Colorado State University

Anaconda Nevada Moly Project: Responsible for mammalian field studies at mine/mill site.

Experience includes design and implementation of wildlife field studies, impact assessment, and mitigation planning of mining developments throughout the intermountain west.

WILLIAM S. KRUPKE, Hydrologist

Continuing Education through National School of Conservation (Extension)

Anaconda Nevada Moly Project: Added support in the writing of the technical report for water resources.

Experience includes field design of monitoring networks and installation of both groundwater wells and surface water gaging stations.

RANDALL J. SNELLENBERGER, Geologist/Geohydrologist

Candidate for B.A. in Geology, Indiana State University

Anaconda Nevada Moly Project: Added support in writing of the technical report for water resources.

Experience includes field installations of groundwater and surface water monitoring stations; collection and analysis of hydrologic data in preparation for writing environmental reports.

STEPHEN R. ANDERSEN, Meteorologist

B.S. in Meteorology, San Jose State University

Anaconda Nevada Moly Project: Responsible for the management and evaluation of the meteorological and air quality monitoring data collected at the mine/mill complex.

Experience includes evaluating meteorological and air quality data and providing interpretation and analyses of these data for use in environmental impact assessment, wind turbine siting and other industrial monitoring programs; design and development of numerous computer application systems for management; development of several national wind energy program computer display and analysis systems.

KIRK D. WINGES, Air Pollution Model Specialist

B.S. in Earth and Planetary Science, Massachusetts Institute of Technology; M.S. in Chemical Engineering, University of California, Berkeley

Anaconda Nevada Moly Project: Responsible for conducting the air quality impact analyses for the proposed mine/mill complex using computer models and for calculating wind erosion losses.

Experience includes studying the diffusion of emissions from anthropogenic sources and establishing mathematical representations for the behavior of these processes; modeling of emissions due to mining operations, electric power generation, and wind erosion; management of air quality mining studies in the state of Wyoming; development of a dispersion regional model for the state of Utah and surrounding regions.

JAMES H. NYENHUIS, Soil Scientist

B.A. in History, Psychology, and Speech, Depauw University; M.A. in Communication Science and Candidate for M.A. in Physical Geography and Soil Science, Michigan State University.

Anaconda Nevada Moly Project: Added support in writing of the Soils Technical Report and in calculating present and projected water and wind erosion conditions at the mine/mill complex.

Experience includes field mapping and classification for a U.S. Department of Agriculture soil survey in Michigan and several mining projects in the western United States.

Abt Associates, Inc., Socioeconomic and Planning Subcontractors

RONALD A. DUTTON, Economist

B.S. and M.S. in Economics, University of Wyoming

Anaconda Nevada Moly Project: Design and implementation of socioeconomics study, forecasting methodology, and data collection; senior author of Socioeconomics Technical Report.

Experience includes direction of and participation in socioeconomics studies for environmental assessments; housing needs analyses and economic/employment forecasting.

KATHLEEN BUTLER, Local Government Specialist

B.A. in Political Science and Master of Public Administration, University of Colorado.

Anaconda Nevada Moly Project: Participation in data collection and analysis of socioeconomic environment, particularly the assessment of the financial resources and capacities of public services; co-author of Socioeconomics Technical Report.

Experience includes participation in socioeconomic studies to determine the capacity and needs for basic municipal, county, and school district services; analysis of budgets and management policies; and participation in several mining EISs.

ELIZABETH HETRICK, Economist

B.A. in Economics, University of Colorado; M.A. in Economics (in progress), University of Denver

Anaconda Nevada Moly Project: Participated in data collection, analysis of the socioeconomic environment, and coordination with other parties; co-author of Socioeconomics Technical Report.

Experience includes economic analyses, data collection, and interviewing for numerous socioeconomics studies for transportation, mining, and energy development projects.

JANET J. SKINNER, Sociologist

B.A. in History, California State University, Fullerton; M.A. in Social Science, California State University, Fullerton

Anaconda Nevada Moly Project: Assessment of possible lifestyle impacts related to the Proposed Action; consultation with other preparers; technical reviewer; contributing author of Socioeconomics Technical Report.

Experience includes planning and implementation of numerous socioeconomic studies related to mining and energy development projects.

Private Individual, Visual Resources Subcontractor

MERLYN J. PAULSON, Visual Analyst

B.L.A. in Landscape Architecture and Environmental Planning, Utah State University; M.L.A. in Landscape Architecture and Resource Planning, Harvard University

Anaconda Nevada Moly Project: Responsible for Visual Resources Technical Report.

Experience includes design and implementation of widely applied visual analysis methodologies using manual and computer techniques; preparation of visual impact and mitigation statements for power plants, stripmines, and transmission lines; application of BLM, Forest Service, and personal methodologies for the above studies.

Nevada State Museum, Cultural Resources Subcontractor

MARY RUSCO, Staff Archeologist

B.A. in Anthropology, University of Kansas; M.A. in Anthropology, University of Nebraska

Anaconda Nevada Moly Project: Performed records search and literature review, field survey, and technical report preparation.

Experience includes directing of various projects to inventory and assess archeological, historic, and paleontological resources.

SUE ANN MONTELEONE, Project Archeologist

B.A. in Anthropology, San Diego State University; Candidate for Master's Degree, San Diego State University

Anaconda Nevada Moly Project: Performed records search and literature review, field survey, and technical report preparation.

Experience includes conducting cultural resources inventories; assisting with cataloging and surveys; and editing and compiling reports.

BUREAU OF LAND MANAGEMENT REVIEW PROCESS

The Bureau of Land Management (BLM) review process consisted of concurrent review of documents by the technical review team, primarily in Battle Mountain, Nevada, and by program leaders in the Nevada State Office, Reno. The technical review team members had the primary responsibility for producing BLM review documents. These final review documents were submitted to program leader counterparts in the Nevada State Office. The documents were then submitted to the Nevada State Office Coordinator for final quality control and approval responsibilities.

Battle Mountain District Office Technical Review Team

The BLM Technical Review Team was responsible for independent evaluation of the

Environmental Impact Statement (EIS). These individuals reviewed the development of the technical reports and EIS documents for compliance with BLM resource policies and directives.

KELLY MADIGAN, District Environmental Coordinator

B.S. in Range Management, California State University, Humboldt

Anaconda Nevada Moly Project: District Review Coordinator; overall review

Experience includes work with the U.S. Forest Service in timber management, plus preparation and review of many environmental assessments and the Tonopah Grazing Environmental Impact Statement.

BERT BRESCH, State Sociologist (Nevada State Office)

B.A. in Sociology and M.A. in Counseling Psychology, California State University, Sonoma

Anaconda Nevada Moly Project: Reviewed social impacts sections.

Experience includes responsibility for sociocultural portions of several EISs prepared for BLM, as well as social impact work for consulting companies.

DAVE LOOMIS, Regional Economist (Nevada State Office)

B.A. in Economics, California State University, Chico

Anaconda Nevada Moly Project: Reviewed economics sections.

Experience includes responsibility for economics portions of several environmental assessments and EISs.

MARK O'BRIEN, Range Conservationist and Watershed Specialist

B.S. in Range Management and B.S. in Wildlife Management, Humboldt State University

Anaconda Nevada Moly Project: Reviewed threatened and endangered plants, air quality, water resources, and aquifer contamination.

Experience includes assistance in preparation of Soils and Watershed sections of the Tonopah Grazing EIS.

DAVE EDDY, Tonopah Resource Area Geologist

B.S. in Geology, West Virginia University

Anaconda Nevada Moly Project: Reviewed mine waste disposal and geotechnical impacts.

Experience includes work as a Hydrologic Technician with the International Boundary and Water Commission and as a Physical Scientist Technician for the Department of the Army.

ROBERTA McGONAGLE, District Archeologist

B.A. and M.A. in Anthropology, University of California, Davis; Ph.D. in Archeology, University of Missouri

Anaconda Nevada Moly Project: Reviewed cultural resources impacts.

Experience includes preparation of Cultural Resources section of the Tonopah Grazing EIS.

DWAYNE SYKES, District Wildlife Biologist

B.S. in Wildlife Science, New Mexico State University

Anaconda Nevada Moly Project: Reviewed wildlife and threatened and endangered animals impacts.

Experience includes work as a Range Conservationist and Wildlife Biologist for the Arizona Strip District EIS.

DAVE McMORRAN, District Outdoor Planner

B. Arch. in Architecture, and graduate work in Land Use Planning and Landscape Architecture, California Polytechnic State University

Anaconda Nevada Moly Project: Reviewed visual resource impacts.

Experience includes part-time employment with the U.S. Forest Service in Public Information Services, preparation of Wilderness, Recreation, and Visual Resources sections of the Tonopah Grazing EIS.

MARY GILLIO, Tonopah Resource Area Realty Specialist

B.S. in Biology, Washington College; M.S. in Botany, University of Colorado

Anaconda Nevada Moly Project: Reviewed solid waste disposal and lands impacts.

Experience includes preparation and review of EISs while working on the Environmental Project Staff of the Richfield District, Bureau of Land Management.

HOWARD GARTHWAIT, Engineering Technician

Associate Degree in Structural Engineering, Oregon Institute of Technology

Anaconda Nevada Moly Project: Reviewed transportation impacts.

Experience includes work as a Soils Inspector and a Water Reclamation Plant Structural and Mechanical Inspector for CH_2 M-Hill Company.

RUSS KOCH, District Wilderness Specialist

B.A. in Rhetoric, University of California, Davis; M.S. and Doctoral Candidate in Forestry, University of Washington.

Anaconda Nevada Moly Project: Reviewed wilderness and noise impacts.

Experience includes work with U.S. Forest Service Experiment Station in Washington State in Wilderness Management.

CALVIN MCKINLAY, District Soil Scientist

B.S. in Agronomy, Utah State University

Anaconda Nevada Moly Project: Reviewed agriculture and soils impacts.

Experience includes work with Soil Conservation Service as a Soil Scientist. Also, reviewed EISs at the Denver State Office and helped prepare Soils section of the Tonopah Grazing EIS.

RODNEY LENTZ, District Geologist

B.S. and M.S. in Geology, Portland State University

Anaconda Nevada Moly Project: Reviewed geological hazards and geotechnical impacts.

Experience includes work for Duval Corporation as an exploration geologist.

JOE DESCHAMP, District Range Specialist

B.S. in Field Biology, Black Hills State College, Spearfish, South Dakota; M.S. in Range Science, Utah State University

Anaconda Nevada Moly Project: Reviewed livestock and wild horse impacts.

Experience includes preparation and review of the range portions of the Tonopah Grazing EIS.

JACK MATUSKA, District Forester

B.S. in Forestry, Syracuse University

Anaconda Nevada Moly Project: Reviewed woodland products impacts.

Experience includes three years with U.S. Forest Service in Boise and Targhee National Forests in Idaho, and the Coleville National Forest in Washington.

Nevada State Office Program Leaders

The Program Leaders were responsible for review and maintenance of technical quality early in the EIS process. The scoping documents, the technical reports, and the EIS were reviewed concurrently with the Technical Review Team to assure compliance with BLM technical resource policies and directives.

MIKE WALKER, Environmental Coordinator

B.S. in Natural Resources and M.S. in Resource Geography, Oregon State University; Post-Masters studies in Geography/ Planning

Anaconda Nevada Moly Project: Overall review responsibility for EIS.

Experience includes land use planning for local governments; writing of EISs in areas of economics, land uses, facility siting, and transportation; and coordination of EISs.

NORMAN MELVIN, Staff Geologist

B.S. in Geology, Michigan State University; M.S. in Geology, University of New Mexico; Post-Masters studies in Environmental Science, University of Virginia

Anaconda Nevada Moly Project: Reviewed ground water sections.

Experience includes work as an exploration geologist in private oil and gas industry; Water Quality and Sediment Transportation Specialist in U.S. Geological Survey; nine years with Environmental Protection Agency in non-point water pollution control involving quality control for groundwater for nuclear plants; six years with Bureau of Land Management (BLM).

LARRY STEWARD, Staff Minerals Specialist

B.S. in Geology, California State University, Fresno

Anaconda Nevada Moly Project: Reviewed milling and mining sections.

Experience includes two years in mineral evaluation and mine plan development in private industry and eight years as a geologist with BLM.

RICHARD HANES, Staff Archeologist

B.S. in Aerospace Engineering, Texas A&M University; M.S. and Ph.D. in Archeology, University of Oregon

Anaconda Nevada Moly Project: Reviewed cultural resources sections.

Experience includes four years at BLM as Staff Archeologist.

LOREN BRAZELL, Staff Watershed Specialist

B.S. in Natural Resource Management, Utah State University

Anaconda Nevada Moly Project: Reviewed air quality and land rehabilitation sections.

Experience includes seventeen years with BLM (seven years as Staff Watershed Specialist); writing of and quality control for air quality sections in several EISs.

DON SPALINGER, Staff Wildlife Biologist

B.S. in Wildlife, Humboldt State University

Anaconda Nevada Moly Project: Reviewed threatened and endangered plants and animals sections.

Experience includes six years with BLM as a wildlife biologist.

RICHARD HAGAN, Staff Landscape Architect

B.S. in Landscape Architecture, Iowa State University

Anaconda Nevada Moly Project: Reviewed visual resources sections.

Experience includes fifteen years as Landscape Architect in private industry and one year with BLM.

DICK MORRISON, Staff Realty Specialist

B.S. in Forestry/Agriculture, Washington State University

Anaconda Nevada Moly Project: Reviewed agriculture, transportation, and waste disposal sections.

Experience includes one year as a Forester with the U.S. Forest Service; ten years as a Forester in Washington, Oregon, and California; two years as a Recreation Specialist with the Bureau of Reclamation, Washington, D.C.; and fourteen years as a Realty Specialist with BLM in California and Nevada.

JERRY HARMAN, Staff Soil Scientist

B.S. in Agronomy, Colorado State University

Anaconda Nevada Moly Project: Reviewed soil sections.

Experience includes 21 years as a Soil Scientist with the Soil Conservation Service and one year with BLM.

DAVE GOICOECHEA, Staff Wildlife Biologist

B.S. in Wildlife, University of Nevada

Anaconda Nevada Moly Project: Reviewed wildlife sections.

Experience includes nine years as a Wildlife Biologist with BLM in Nevada and New Mexico.

DAVE HARMON, Staff Wilderness Specialist

M.S. in Forest Management and Recreation, Oregon State University

Anaconda Nevada Moly Project: Reviewed wilderness sections.

Experience includes three years as a Forester with U.S. Forest Service and two years as a Wilderness Specialist with BLM in Nevada.

GEREN LONG, Staff Range Conservationist

B.S. in Range Management/Agriculture, Oregon State University

Anaconda Nevada Moly Project: Reviewed livestock grazing sections.

Experience includes 23 years as a Range Conservationist and BLM Area Manager in Oregon, Nevada, and Utah.

ROSS FERRIS, Staff Wild Horse and Burro Specialist

B.S. in Range Management, Utah State University

Anaconda Nevada Moly Project: Reviewed wild horse and burro sections.

Experience includes 28 years as a range conservationist and Wild Horse Specialist with BLM in Arizona, Nevada, and Washington, D.C.

OSBORN CASEY, Staff Fisheries Biologist/Forester

B.S. and M.S., University of Idaho

Anaconda Nevada Moly Project: Reviewed woodland products and riparian habitat sections.

Experience includes sixteen years as a Fisheries Biologist with Idaho Fish and Game Department, five years as a Fisheries Biologist with U.S. Forest Service, and five years as a Fisheries Biologist with BLM.

DICK JEWELL, Staff Hydrologist

B.S. in Earth Science (Hydrology/Geochemistry), California State University, Bakersfield

Anaconda Nevada Moly Project: Reviewed water resources sections.

Experience includes two years in private industry as a consulting hydrologist, four years with U.S. Forest Service as a hydrologist and hydrolic technician, and six years with BLM as a hydrologist.

BERT BRESCH, State Sociologist

B.A. in Sociology and M.A. in Counseling Psychology, California State University, Sonoma

Anaconda Nevada Moly Project: Reviewed social impacts sections.

Experience includes responsibility for sociocultural portions of several EISs prepared for BLM, as well as social impact work for consulting companies.

DAVE LOOMIS, Regional Economist

B.A. in Economics, California State University, Chico

Anaconda Nevada Moly Project: Reviewed economics sections.

Experience includes responsibility for economics portions of several environmental assessments and EISs.

Washington Office

JAMES P. CLASON, Natural Resources Specialist

B.S. in Forest Management, University of Idaho

Anaconda Nevada Moly Project: The entire EIS was reviewed to assure compliance with National Environmental Policy Act, Department of Interior, and BLM requirements.

Experience includes five years as Chief of the Division of Resources, BLM, Eugene, Oregon District; three years as Area Manager, Medford, Oregon; and 23 years experience in multiple use planning and management.

CHAPTER 5

CONSULTATION AND COORDINATION

CONSULTATION WITH OTHERS

The Environmental Impact Statement (EIS) for the Anaconda Nevada Moly Project was prepared by Environmental Research and Technology, Inc. (ERT) to Bureau of Land Management (BLM) standards. In accordance with the National Environmental Policy Act of 1969 (NEPA), BLM and ERT have implemented public and interagency consultation and coordination throughout the development of this EIS. This process has included meetings with affected Federal, state, and local agencies; public meetings; and correspondence with concerned interest groups and individuals.

Scoping Process

The scoping process for the Anaconda Nevada Moly Project EIS was conducted from August 15 to September 20, 1979, and included the development of a scoping document, mailing of letters and a news release, and several briefing meetings. The following specific activities occurred during the scoping process.

Date	Activity
8/15/79	Notice of intent to prepare EIS published in *Federal Register*
8/17/79	Letter of invitation to participate in scoping process and Preliminary Scoping Document sent to affected Federal, state, and local government agencies; affected Indian tribes; and other interested groups and individuals
8/17/79	News release issued statewide announcing scoping process and public meetings
8/20/79-9/4/79	BLM Nevada State Office representatives available in Battle Mountain, Reno, and Tonopah, Nevada, to discuss scoping process
8/21/79	Briefing with Congressional Field Representatives, Reno, Nevada
9/4/79	Public Scoping Meeting, Austin, Nevada
9/5/79	Public Scoping Meeting, Tonopah, Nevada
9/6/79	Public Scoping Meeting, Carson City, Nevada
9/6/79	Briefing Meeting with Nevada State Clearinghouse, Carson City, Nevada
9/20/79	Deadline for comments on scoping process (32 written and verbal comments were received as a result of the scoping process; these comments are included in the Scoping Document for the Anaconda Nevada Moly Project)

Draft EIS

Many Federal, state, and local government agencies as well as private groups and individuals were contacted and have contributed to the preparation of the Draft EIS. The agencies contacted for consultation include:

Federal Government

- U.S. Department of the Interior
  - Bureau of Land Management
  - Bureau of Mines, Reno, Nevada
  - Fish and Wildlife Service, Reno, Nevada, Sacramento, California; Portland, Oregon
  - Heritage Conservation and Recreation Service, San Francisco, California
- U.S. Department of Agriculture
  - Toiyabe National Forest
  - Soil Conservation Service, Reno, Nevada; Tonopah, Nevada
- U.S. Department of Commerce
  - Bureau of the Census
- U.S. Department of Defense
  - U.S. Air Force

U.S. Department of Energy

U.S. Environmental Protection Agency, San Francisco, California

U.S. Postal Service

Federal Housing Administration, Reno, Nevada

State of Nevada

Department of Conservation and Natural Resources
- Division of Environmental Protection
- Division of Forestry
- Division of Historic Preservation and Archeology
- Division of Mineral Resources
- Division of State Lands
- Division of State Parks
- Division of Water Resources

Department of Highways

Department of Human Resources
- Division of Health, Vital Statistics Section

Emergency Medical Service

Department of Taxation

Department of Motor Vehicles
Nevada Highway Patrol

Employment Security Department

Department of Wildlife

Bureau of Mines and Geology

State Planning Coordinator

State Museum

University of Nevada

Public Service Commission

Historical Society

Local Government

Nye County
- Administrator's Office
- Assessor's Office
- Central Nevada Rural Health Consortium
- Department of Agriculture, County Extension Service
- Department of Planning, County Planner
- Fifth Judicial District
- General Hospital
- Justice of the Peace
- Juvenile Probation Department
- Planning Commission
- Road and Bridge Department
- Search and Rescue
- Seniors' Administration
- Sheriff's Department
- Superintendent of Schools
- Tonopah Airport

Town of Tonopah
- Advisory Board
- Chamber of Commerce
- Fire Department
- Public Library
- Public Utilities

Private Groups

Am-Arcs (Amateur Archeologists) of Nevada
AMAX Corporation, Empire, Colorado
Atlantic Richfield Company, Los Angeles, California
Audubon Society, Lahontan Chapter
Cal/Gas, Tonopah, Nevada
David D. Smith and Associates, San Diego, California
Desert Research Institute, Reno, Nevada
Friends of the Earth, San Francisco, California
Friends of Nevada Wilderness, Carson City, Nevada
Houston Oil and Minerals, Carson City, Nevada
Lander County Commissioners, Austin, Nevada
Moly Corporation, Questa, New Mexico
Natural Resources Defense Council, Palo Alto, California
Nevada Archeological Association
Nevada Cattlemen's Association, Elko, Nevada
Nevada Mining Association, Carson City, Nevada
Nevada Off-Road Vehicle Association
Nevada Organization for Wildlife, Reno, Nevada
Nevada Outdoor Recreation Association, Carson City, Nevada
Nevada Telephone and Telegraph Company, Tonopah, Nevada
Nevada Wildlife Federation, Sparks, Nevada
Nevada Woolgrowers' Association
Nye County Fish and Game Association
Republic Geothermal, Inc., Santa Fe Springs, California
Reynolds Electrical and Engineering Corporation, Las Vegas, Nevada
Round Mountain Mining Company, Round Mountain, Nevada
Sierra Club, Reno, Nevada
Sierra Pacific Power Corporation, Reno, Nevada

Smoky Valley Power Committee, Austin, Nevada
Souther, Spaulding, Kinsey, Williamson and Schwabe, Portland, Oregon
T. Baker Smith and Son, Inc., Houma, Louisiana
Verity, Smith and Kearns, P.C., Tucson, Arizona
Wildlife Society, Nevada Chapter
William F. Pillsbury, Inc., Reno, Nevada
Woodward-Clyde, Denver, Colorado

Individuals

Charles H. Coleman, Redwood City, California
David B. Slemmons, University of Nevada, Reno, Nevada
Dr. Eldon Kienholz, Colorado State University, Fort Collins
Dr. James Deacon, University of Nevada, Las Vegas
Dr. Paul Tueller, University of Nevada, Reno
Dr. James Walker, University of Nevada, Reno
H. Paul Friesema, Northwestern University, Evanston, Illinois

LIST OF AGENCIES, ORGANIZATIONS AND PERSONS TO WHOM COPIES OF THE STATEMENT ARE SENT

The following agencies, groups, and individuals will be sent a copy of the Draft EIS for review and comment. All comments received will be carefully reviewed and considered for incorporation in the Final EIS.

Federal Government

U.S. Department of the Interior
Special Projects Office, Reno
Bureau of Land Management
Battle Mountain District
Carson City District
Elko District
Ely District
Las Vegas District
Winnemucca District
Nevada State Office, Reno
Regional Environmental Officer, San Francisco, California
Bureau of Indian Affairs, Stewart, Nevada
Bureau of Mines, Reno, Carson City, Nevada
Geological Survey, Carson City, Nevada
Heritage Conservation and Recreation Service, San Francisco, California
Fish and Wildlife Service, Reno, Nevada

U.S. Department of Agriculture
Toiyabe National Forest, Reno, Austin, Tonopah, Nevada
Soil Conservation Service, Reno, Tonopah, Nevada

U.S. Department of Commerce, Reno, Nevada

U.S. Department of Transportation
Federal Highway Administration, Carson City, Nevada

U.S. Environmental Protection Agency, San Francisco, California

U.S. Department of Energy, San Francisco, California

Federal Housing Administration, Reno, Nevada

U.S. Senate and House of Representatives
Senator Howard W. Cannon
Senator Paul Laxalt
Representative James Santini

State of Nevada

Governor, State of Nevada

State Planning Coordiator

State Clearinghouse (distributes copies to and coordinates responses from Nevada departments, divisions, and boards)

Governor's State Multiple Use Advisory Committee on Federal Lands

Legislative Counsel Bureau

University of Nevada
Dean, College of Agriculture
Dean, Mackay School of Mines
Bureau of Business and Economic Research
Bureau of Mines

Local Government

State Senators
Richard Blakemore, Tonopah
Norman Glaser, Halleck

State Assemblymen
Jack Fielding, Pahrump
John Marvel, Battle Mountain

Lander County Commissioners

Lander County Planning Commission

Nye County Planning Commission

Central Nevada Resource Development Authority

Non-economic Interest Groups

Conservation Interests
Audubon Society, Lahontan Chapter
Friends of Nevada Wilderness

Friends of the Earth, Inc., Utah
Natural Resources Defense Council
Nevada Organization for Wildlife
Nevada Outdoor Recreation Association
Nevada Wildlife Federation
Sagecountry Alliance for a Good Environment, Oregon
Sierra Club, Northwest Office
Sierra Club, Toiyabe Chapter
The Wilderness Society, Denver, Washington, D.C.
Wildlife Management Institute, Portland, Oregon
Wildlife Society, Nevada Chapter

Archeological Interests
Am-Arcs (Amateur Archeologists) of Nevada
Nevada Archeological Association

Recreational Interests
Nevada Off-Road Vehicle Association
Nye County Fish and Game Association
American Fisheries Society, Maryland

Local Interest Groups
Smoky Valley Power Committee

Economic Interest Groups

Livestock
Nevada Cattlemen's Association
Nevada Woolgrowers' Association
Pacific Legal Foundation, Washington, D.C.
Public Lands Council, Washington, D.C.

Utilities
Nevada Power Company, Las Vegas, Nevada
Sierra Pacific Power Company, Right-of-Way Department, Reno, Nevada

Mining
Anaconda Copper Company, Nevada-Moly Project Manager
Nevada Mining Association

Geothermal
Republic Geothermal, Inc., Santa Fe Springs, California

Oil
Atlantic Richfield Company, Los Angeles, California

Individuals

A list of individuals believed to be interested in the proposal and alternatives is being maintained by the Division of Planning and Environmental Coordination, BLM, Reno, Nevada. The names of these individuals are not being printed in this document in order to protect individual privacy. If individuals do comment on the Draft EIS, their names and letters become part of the public record.

The following individuals either have requested receipt of all Nevada EISs or have asked to be on the mailing list for this EIS.

Dr. William E. Southern, Northern Illinois University
John Hart, California
Dick Loper, Wyoming
James S. Lindzey, Pennsylvania State University
H. Paul Friesema, Northwestern University
Souther, Spaulding, Kinsey, Williamson, and Schwabe, Oregon
David D. Smith and Associates, California
T. Baker Smith and Son, Inc., Los Angeles, California

Public Hearings

Public hearings, announced in the *Federal Register* and by news release, tentatively will be held in Austin, Tonopah, and Carson, Nevada. News releases will be mailed to a "statewide" media list comprised of newspapers, radio and television stations. Some individuals and interest groups have also requested to be on the "statewide" list, thus receiving all BLM, Nevada State Office news releases. Media addresses are available through the BLM Public Affairs Office, Reno.

Copies of the Draft EIS and copies of all referenced ERT Technical Reports will be available at BLM Offices in Washington, D.C.; Reno; Battle Mountain; Carson City; Elko; Ely; Las Vegas; and Winnemucca, Nevada. Public libraries which will be sent a copy are: the Churchill Public Library, Fallon; Clark County Library, Las Vegas; the Elko County Library, Elko; the Esmeralda County Library, Goldfield; the Eureka County Library, Eureka; the Lander County Library, Battle Mountain; the Mineral County Library, Hawthorne; the Nevada State Library, Carson City; the Nye County Library, Tonopah; the Washoe County Library, Reno; and the White Pine County Library, Ely. Draft EISs will also be sent to the University of Nevada Library in Reno and Las Vegas.

CHAPTER 6

APPENDIX A

REVEGETATION GUIDELINES

Introduction

The following are revegetation guidelines outlining the general procedures which can be applied to disturbed areas at the mine/mill site. Various guideline specifics such as species selection, site-specific mulch use, irrigation techniques, etc., will not be discussed in great detail at this time. These specifics will be formalized when the overall mine operation plan is finalized and will be highly dependent upon the results of revegetation trials conducted on-site under varying conditions. These tests will be conducted throughout the life of the mine in the form of test plots. Final selection of revegetation techniques will also be influenced by observations of other mining operations within the region, availability of materials and equipment, and an in-depth survey of literature developed in and for this climatic zone.

The area will be reclaimed according to the post-mining land use objective of grazing and wildlife habitat. The emphasis of reclamation techniques to be instituted is centered around the goals of retaining and utilizing to best advantage, incident precipitation, controlling erosive forces, and managing grazing activities. The attainment of these goals will lead to the return of the area to its premining land use.

Revegetation techniques can be divided into two classes for the purpose of this preliminary report - those that are applicable over the project as a whole (General) and those that are applicable to individual project components (Specific). General techniques include soil materials handling; soil reapplication; seedbed preparation; fertilization; methods of seeding, mulching, weed control, and maintenance. Specific techniques refer to practices unique to each component of the project.

General Techniques

Soil Material Handling

Soil materials will be salvaged from the tailing pond area. Approximately 6 to 12 inches of soil will be removed from this area for use as seedbed material.

After soil materials are removed from the construction site, they will be taken immediately to a designated area for storage. Stockpiles will assume as low a profile as possible, given area considerations, to reduce water erosion hazards and permit the establishment of protective vegetative cover.

Following stockpiling, the stockpiles will be stabilized. Chemical adhesives will be sprayed over the stockpile to form a crust which will inhibit soil loss from erosive forces. This technique will be repeated as needed for the life of the stockpile. The stabilization system may also incorporate a revegetation phase including fertilization, seeding, and mulching in combination with chemical treatments for long-term stabilization. Inclusion and application of the vegetation stabilization phase will be dependent on a detailed analysis of equipment and materials available. This type of two-phase system has been used successfully on other mining operations for stabilization purposes.

Soil Reapplication

Soils will be returned to disturbed areas that are to be revegetated immediately prior to the time of planting. This requirement will be waived if it is determined that fall resoiling and seedbed preparation combined with fall or early spring seeding is desirable for revegetation success. No soil materials will be returned unless they are to be promptly revegetated. Reapplication operations will take place along the contour of slopes, if possible, or perpendicular to the prevailing wind direction in the case of level areas. Reapplied soil will be left in a loose condition to aid in moisture retention and decrease wind losses.

Seedbed Preparation

Seedbeds will be cleared of all large rocks and other debris to facilitate seeding. Where

drilling of seed will be accomplished, the seedbed will be left in a smooth condition to facilitate seeding operations. The seedbed will be packed as necessary to assure a firm condition. Where broadcast seeding is chosen, the seedbed will be left in a roughened condition after grading to facilitate seeding. Discing or harrowing will be performed as necessary to attain this condition. Road construction in steeper terrain may necessitate the construction of steep cut faces. On slopes which are inaccessible to machinery, the slope face will be scarified by applicable means such that 4 to 6 inches of loose geologic material exist as a seedbed (U.S.D.A., Soil Conservaton Service 1976b). (On steep, hardrock slope faces, slope-roughening techniques may not be successful due to the nature of the geologic material.)

Consideration will be given to utilizing "gouging" as a surface preparation technique for level areas to replace those techniques associated with drill seeding. This surface preparation technique has been developed as a method of increasing the moisture-retention capabilities of seedbeds in arid environs. A special implement is drawn across the seedbed resulting in depressions in the seedbed which accumulate incident moisture and provide a more amenable microenvironment for establishing species. Selection of this technique will be based on an evaluation of success levels of other mines with similar environments and the compatibility of this technique with other revegetation activities (shrub planting, irrigation, etc.) to be applied to disturbed areas.

All seedbed preparation operations will take place on slope contours or, in the case of level areas, perpendicular to the prevailing wind direction. All operations will be applied immediately prior to seeding.

Fertilizing

All areas to be revegetated will be fertilized. Amounts of fertilizer to be added will be calculated from soil tests made prior to soil reapplication. Lab analyses will be conducted for nitrate-nitrogen, organic matter, available phosphorus, soluble potassium, and the appropriate micronutrients.

When drilling seed, fertilizer materials (except nitrogen) will be banded during the seeding operation. In some cases, depending on soil tests, broadcasting of fertilizers may also be applicable. When broadcast seeding, fertilizers will be applied to the soil surface prior to seeding and worked into the soil surface by discing, harrowing, or raking on the contour or perpendicular to the prevailing wind direction. All nitrogen applications will be made by broadcasting during the second growing season. Depending on the amount of soil to be reapplied and other factors, endomycorrhyza associations may need to be added to reclaimed areas.

Methods of Planting

Planting of grass species and shrub species to be established by seed will be accomplished by one of two methods. Drill seeding will be chosen for use where slopes permit machinery access and the disturbed area is of a size and configuration amenable to this technique. Drilling will be accomplished by using a heavy-duty range drill equipped with seedbox agitators, double-disc furrow openers with depth control bands, seed-metering device, and packer wheels. Row spacing will be determined after species are selected. Depth of seeding will be one-half to three-quarters of an inch. (U.S.D.A., Soil Conservation Service 1971a). Drill seeding will take place on the contour or perpendicular to the prevailing wind direction. Broadcast seeding will take place on all areas not accessible to a drill. Seeds will be evenly broadcast over prepared slopes. Broadcasting will be completed by hand or with a hydroseeder. The use of a hydroseeder will be critically evaluated since the water carrier may induce premature seed germination. This could result in an unsuccessful seeding operation if a dormant seeding was being attempted. Following broadcasting, the seeded areas will be lightly scarified to cover the seed unless mulching activities will adequately cover the seed. Species will be selected from Tables A-1 and A-2 (Adapted from: Kilpatrick et. al. 1978). Only certified seed will be used if it can be obtained. Seeding will be accomplished only during recognized planting seasons. Late fall is generally recommended (Kilpatrick et. al. 1978) so as to take advantage of winter moisture during the spring establishment period. Planting at the project site will take place during this time period if at all possible. Early fall and spring plantings are also acceptable, but are not as desirable as late fall plantings.

Planting rates will be calculated for drill seeding based (1) on the percentage of the mixture comprised by each species, times (2) the pure planting rate for each species (PLS). Rates for broadcasting will be at least double the drill-seeding rate.

Planting of shrub seedlings may occur on some disturbed areas. If utilized, shrub seedlings will be planted as follows:

Species will be selected from Table A-2. Either bare-root or potted (e.g. in cans or tubes) plants will be considered acceptable, but pot-

TABLE A-1

GRASS AND FORB SPECIES ADAPTED TO THE ANACONDA SITE

Species	Scientific Name	Minimum Precipitation Requirement in Inches
Grasses		
Alkali sacaton	*Sporobolus airoides*	6-8
Beardless wheatgrass	*Agropyron inerme*	8-10
Canby bluegrass	*Poa canbyi*	8-10
Crested wheatgrass	*Agropyron cristatum*	8-10
Desert wheatgrass	*Agropyron desertorum*	8-10
Galleta	*Hilaria jamesii*	8-10
Indian ricegrass	*Oryzopsis hymenoides*	6-10
Sand dropseed	*Sporobolus cryptandrus*	8-10
Siberian wheatgrass	*Agropyron sibiricum*	8-10
Squirrel tail	*Sitanion hystrix*	6-10
Streambank wheatgrass	*Agropyron riparium*	8-10
Forbs		
Australian saltbush	*Atriplex semibaccata*	8-10

Adapted From: Kilpatrick, H.M., G. Mullings, F.F. Peterson, E. Naphan, R.E. Eckert, N.R. Ritter, J. McWilliams, D.A. Klebenow. 1978. Conservation plantings for rangeland, windbreaks, wildlife, soil conservation service. Reno, Nevada. 24 pp.

ted plants will be preferred if supplies are adequate. Bare-root stock will be 1 to 3 years old and potted plants will be acceptable if 1 year old. Delivery date will be set as close to the time of planting as possible. Stock will be protected from drying out until planting is to begin. Only stock in good condition will be accepted for delivery. A mechanical planter will be used according to the manufacturer's specifications. After planting, each seedling will be watered (U.S.D.A., Soil Conservation Service 1976a).

Where a mechanical planter is not used, hand-planting will be accomplished. For each seedling a hole will be dug large enough to accept the root system and the seedling will be planted such that the root collar is just under the back fill surface.

A small amount of slow-release fertilizer will be added to the planting hole. The hole will then be backfilled and the soil firmed around the seedling creating a depression or "dish" to aid in moisture accumulation. Each planting will be watered after backfilling. Planting will be accomplished in a random fashion except when species are planted in gouged areas. (U.S.D.A., Soil Conservation Service 1971a; U.S.D.A., Soil Conservation Service 1976a).

Planting of stock will take place during the dormant period in either late fall or early spring (U.S.D.A., Soil Conservation Service 1971b).

Mulching and Cover Crops

All slopes 3:1 or steeper will be mulched. All level areas will be mulched if supplies of mulch can be obtained. Mulching is considered essential for aiding revegetation and controlling erosion on slopes and is strongly suggested for level terrain in Nevada (U.S.D.A., Soil Conservation Service 1976a).

On level to gentle slopes, straw will be applied after seeding at the rate of two tons per acre or to approximately 80 to 90 percent ground cover (Cook et. al. 1974). It may be applied by hand or with a blower. Blown mulch will not be chopped so fine as to inhibit crimping and/or effectiveness. The straw will be crimped in perpendicular to the prevailing wind direction to prevent wind losses. Crimping will be done with a disk (notched coulters if available) with the blades set straight so that the straw is crimped to a depth of 2 to 4 inches. Hydromulching with wood fiber may be utilized to control erosion on slopes 3:1 or steeper. The fiber mulch will be applied to the slope after seeding at a rate suggested by the manufacturer. A tackifier will be applied over the wood fiber to increase bonding among fibers. Seeding will not be included with the mulch.

Other mulching methods may alternately be considered for use in lieu of hydromulching,

TABLE A-2

SHRUB AND TREE SPECIES ADAPTED TO THE ANACONDA SITE

Species	Scientific Name
Shrubs	
Big sagebrush	*Artemisia tridentata*
Bitterbrush	*Pursia tridentata*
Black greasewood	*Sorcobatus vermiculatus*
Black sagebrush	*Artemisia nova*
Cliffrose	*Cowania stansburiana*
Ephedra	*Ephedra spp.*
Fourwing saltbrush	*Atriplex canescens*
Rubber rabbitbrush	*Chrysothamnus nauseosus*
Shadscale	*Atriplex confertifolia*
Tree	
Salt ceder	*Tamarix spp.*

Adapted In Part From: Kilpatrick, H.M., G. Mullings, F.F. Peterson, E. Naphan, R.E. Eckert, N.R. Ritter, J. McWilliams, D.A. Klebenow. 1978. Conservation plantings for rangeland, windbreaks, wildlife, soil conservation service. Reno, Nevada. 24 pp.

given site considerations (primarily wind erosion potential) and the availability of hydromulching equipment. Broadcast straw anchored by netting or tackifiers is a possibility as are erosion control blankets. Gravel or cobble mulches will also be considered. An analysis and selection of the appropriate mulch materials will be made during finalization of the site-specific revegetation plan according to site-specific conditions and economic considerations.

Planting annual cover crops will also be considered as a means of surface stabilization. This technique is frequently used as a more economical method of surface stabilization than mulching when climatic and erosion hazard conditions allow. In arid areas such as the project site, this method is more commonly used with an irrigation system but may be appropriate under dryland conditions on seedbed materials with sufficient water-holding capacity. The feasibility of this technique will be assessed on the basis of erosion hazards, seedbed moisture relationships, and ease of plant establishment.

Weed Control

The necessity of establishing a weed control program has not yet been determined. However, due to the limited amount of rainfall in some areas, competition for available moisture from weeds in permanent plantings must be negated if such competition would occur. Where necessary, a weed control program would be established after consultation with the District Conservationist of the Soil Conservation Service. Only approved herbicides would be used.

General Maintenance

To insure proper revegetation, maintenance of the reclaimed areas will be provided since several years may be required to achieve revegetation.

Inspection of all reclaimed areas will be made in March, July, and November of each year until the reclaimed areas become stabilized and reclamation objectives are met.

A yearly maintenance application of nitrogen fertilizer will be applied as needed to the area until the maintenance program is terminated.

Where slides, slips, slumps, and other erosion problems occur on reclaimed areas, these conditions will be remedied as soon as logistical considerations allow. The repaired areas will be regraded, fertilized, seeded, and mulched again, if necessary. Inspections will be increased to one every week where major failures occur and continued at this rate until the problem is solved.

Where herbaceous seeding attempts have failed, the area will be fertilized, seeded, and mulched at the proper time as is necessary to provide for adequate vegetative cover.

If nutrient deficiency symptoms develop on revegetated areas, this condition will be resolved by adding the deficient nutrient in the proper, agriculturally accepted method.

Where rodent or large mammal populations endanger the success of planting, animal con-

trol will be practiced until species become established. The District Conservationist will be asked to participate in designing a program to eliminate this problem. Fencing of revegetated areas will be considered for use if no other method of inhibiting grazing and associated disturbances can be found.

Special Techniques

Erosion Control

On steep slopes, though water erosion is not expected to be a year-long problem at the project site, steps will be taken to minimize the damage to slopes which could result from high intensity seasonal rains. A diversion or berm will be created at the crest of each slope to prevent runoff from traversing slope faces. The crest and toe of each slope will be rounded during grading to inhibit erosion and slope failure (Brammer 1978). If necessary, small earth berms will be constructed parallel to the contour on slope faces after resoiling to break soil length. Slopes may also be contour terraced, furrowed, or trenched to trap surface moisture. In draws and gulches, erosion control devices, may be necessary to control short-term, high volume surface runoff.

Slopes which are parallel to the prevailing wind direction could experience erosional loss if winds are sufficient to significantly degrade applied mulch materials. Where mulch is lost and it appears that subsequent mulch applications will also be lost without additional protection, two additional procedures will be considered for application. Snow fences can be erected at calculated intervals on slopes perpendicular to the prevailing wind direction. These would serve as "mechanical windbreaks" to decrease erosional loss. The possibility of establishing living windbreaks will also be given consideration. Adaptable tree or large shrub species can be planted in windbreak fashion to achieve wind erosion control. Species would be planted as described previously for shrubs. Salt cedar has been used with success for this purpose on other disturbed areas in this region (Garrison 1979).

Level Surfaces

Water erosion is not expected to be a problem which would significantly degrade level surfaces which are resoiled and seeded. However, wind erosion could be a significant problem on areas with establishing vegetation. Where wind erosion presents a problem to plant establishment and cannot be remedied by more simplistic means, snow fences will be erected at calculated intervals; or, tree/shrub windbreak plantings will be established to decrease wind speed across the seeded area. The area will be graded such that hummocks or small hills susceptible to erosion do not exist.

Where areas are to be reclaimed on a yearly basis, reclamation will begin on the windward side of the disturbed area. This will prevent possible "sandblasting" of emerging seedlings downwind of a newly resoiled area. This technique could also be of benefit in creating a wind barrier (vegetative and/or mechanical) for succeeding areas to be reclaimed downwind from a stabilized area.

Access Road Revegetation

Following abandonment of the mine/mill site roads and prior to the recognized planting seasons, any road surfacing materials which would interfere with revegetation will be removed. Following removal, the road surface will be ripped to a depth of 2 feet. The surface will then be disced to break up large clods. Any large rocks which would interfere with subsequent operations will be removed. Berms will be constructed on the road surface, perpendicular to the roadway, to limit the possibility of erosion along the road surface. The spacing and height of berms will be calculated prior to road revegetation. Revegetation will then be completed as described under "General Techniques."

Mill and Facilities Sites

With the limited precipitation, it will be necessary to remove all structures and floor slabs to achieve a soil base suitable for revegetation. Foundations will be removed below the surface and the holes will be backfilled. The areas will be graded and contoured.

On all areas which were compacted due to construction or travel, ripping, discing, and grading will be accomplished as described under "Access Road Revegetation" above. Revegetation will then be completed using techniques described under "General Techniques." Spilled oil or other chemicals that may inhibit revegetation will be removed and disposed of in a proper disposal site.

Tailings Pond

Two methods for revegetating the tailings pond at the project site are possible at this time: coverage with native soil materials prior to initiating revegetation and direct amelioriza-tion and revegetation of raw tailings.

Limited information available at the present time (Dean et. al. 1971) indicated that even a small covering (4 inches) of soil over tailings will result in acceptable revegetation initially.

Intuitively, larger amounts of soil placed over tailings would increase the chances of long-term vegetative success. Additional literature review must be conducted concerning the depth of soil required.

Acceptable revegetation of raw copper tailings have been reported (Ludeke 1973) utilizing a compendium of techniques to ameliorate the negative properties of the tailings. Required techniques include:

- removing excessive salts and heavy metal phytotoxicants,
- consolidating sandy soil to minimize wind erosion, and
- adding organic matter to the raw tailings materials.

The chemical-vegetative procedure (Dean et. al. 1974) of stabilizing mine tailings developed at the U.S. Bureau of Mines may also be applicable to the project site. This procedure combines seeding with adapted species, applying chemical soil-binding agents, and irrigation for the direct ameliorization of tailings materials. Reports of success have been favorable under various conditions.

Other authors (Nielson and Peterson 1972) indicate that irrigation should be considered necessary for successful plant establishment and perhaps for some years after to ensure vegetative cover.

Irrigation

At this time, the extent to which irrigation will be applied to revegetated areas has not been identified. The final decision will be based upon consideration of equipment availability, adequacy of water sources, economic feasibility, and necessity in terms of plant growth.

Anaconda will investigate various available irrigation systems. Regardless of the system eventually chosen, should irrigation be considered desirable, judicious water application will be practiced. Only water sufficient to aid in the establishment of seedlings and growth through periods of soil moisture depletion will be applied. The use of irrigation techniques will not influence species selection. Plant species not adapted to climatic conditions at the site will not be planted since irrigation would be discontinued after plant establishment and soil stabilization.

APPENDIX B

LIST OF CANDIDATE THREATENED AND ENDANGERED PLANT SPECIES WHICH OCCUR IN THE GENERAL PROJECT REGION BUT ARE NOT FOUND IN HABITAT TYPES AFFECTED BY THE NEVADA MOLY PROJECT

Species	General Habitat Description
Ascelepias toquimanus	Gravelly hillsides and benches, among pinyons and junipers; in stiff calcareous soils, often under low sagebrush; 7,000 feet on east slope of Toquimas Range, Nye County.[1]
Astragalus funereus	Clay ridges, gravelly hillsides; usually on limestone among sagebrush; on deep gravelly slopes, unstable soils.[2]
Cryptantha hoffmannii	Sandy loam at top of pass 5 miles west of Warm Springs; northeast exposure, 6,200 feet; with juniper, pinyon, and sagebrush; in diatomic soil 2 miles east of Basalt Mineral County.[3]
Draba arida	Rocky east slope of Toiyabe Dome; 10,500 feet; northwest slope of Toiyabe Dome; Bunker Hill, Lander County.[4]
Frasera pahutensis	Endemic to a limited area on Pahute Mesa, associated with pinyon pine and sagebrush.[5]
Lewisia maguirei	Loose, denuded soil from limestone, with pinyon-juniper-sagebrush; raw, gravelly clay slope in open pinyon-juniper country.[6]
Mertensia toiyabensis	Near wet place, with sagebrush, rose, and greasewood; canyons at north end of Toiyabe Range, near Austin; 7,800-8,600 feet.[2]
Penstemon pudicus	East side of Kawich Range, Nye County; near Eden Creek Mining Camp; steep mountain slopes, along washes and lower slopes; with sagebrush, pinyon-juniper, woodland border species.[7]
Trifolium andersonii ssp. *beatleyae*	Flat rock outcrops around pinyon-juniper, Nye County Toquima Range; sparsely vegetated gravel, pinyon-juniper and big sagebrush cover; clay soil.[2]

[1]Barneby, R. C. 1964. Atlas of North American *Astragalus*. Volume I and II. Memoirs of the New York Botanical Garden Volume 13 1188 pp.

[2]Pinzl, A. February 1980. Curator, Nevada State Museum. Personal communication.

[3]Williams, L. February 1980. Botanist. Personal communication.

[4]Hitchcock, C. L. 1941. A revision of the *Drabas* of North America. University of Washington Publications 11:52.

[5]Reveal, J. L. 1971. A new *Frasera* from southern Nevada (Gentianaceae). Bulletin of the Torry Botanical Club 98:107-108.

[6]Holmgren, A. 1954. A new *Lewisia* from Nevada. Leaflet Western Botanical 3(6):135-137.

[7]Reveal, J. and J. Beatley. 1971. A new *Penstemon* (Scrophulariaceae) and *Grindelia* (Asteraceae) from southern Nye County, Nevada. Bulletin of the Torry Botanical Club 98(6):332-335.

APPENDIX C

METHODS USED TO INVENTORY CULTURAL RESOURCES

Mine/Mill Complex

Reconnaissance was conducted according to a stratified sampling design. Topographic features (degree of slope, proximity to intermittent water sources, and elevations above the valley floor) were used to define strata judged to have varying probable site frequencies. Stratum 1, (on the alluvial floor of the mill site) with highest (relative) expected site frequency, was inspected by archeological technicians walking along parallel transects at 30-meter intervals. Stratum 2 (on the steep foothills of the mine site) is an area of relatively rugged terrain. The central part of Stratum 2 was walked at 60-meter intervals and no sites were recorded; hence, the remainder of Stratum 2 was inspected intuitively. Areas included in the intuitive inspection were along dry creeks, ridgetops, saddles, and the areas of lowest relief.

Transects were oriented north-south or east-west, with the direction chosen with ease of access in mind.

When an artifact was found, the immediate vicinity was inspected systematically in order to determine if there were associated artifacts and the size of the site area. Sites were photographed and marked with surveyor's flagging. All artifacts were collected from sites with fewer than 20 artifacts on the surface. No test pits were excavated. Inspection of ground surface, animal burrow backdirt, and other subsurface exposures was the basis for evaluating the probability of associated subsurface cultural deposits. Observations were recorded on standard archeological site inventory forms.

Artifacts collected were described and cataloged on standard catalog cards used for the curation of artifacts for the Bureau of Land Management (BLM) in Nevada. Location of sites was plotted on U.S. Geological Survey (USGS) maps. Site inventory records, copies of catalog cards, and the maps showing site locations are included in the ERT Cultural Resources Technical Report (1980).

Proposed Transmission Line Corridor

Most of the 86-mile route was flagged approximately every one-half mile. Approximately 3 miles at the southern end of the route were not clearly flagged and occasional flags along the route were out of sight in low spots; but the majority of the line was regularly marked and readily followed.

The corridor was surveyed by teams of two archeological technicians spaced approximately 60 feet apart. The entire length of the route was covered.

The locations of all artifacts were recorded, all significant artifacts and sites were flagged and their relationships to Sierra Pacific Power Company flags or existing power poles were noted to facilitate later collection. No artifacts were collected.

Observed sites and artifacts were recorded on standard archeological site inventory forms. Location of sites was plotted on USGS 15- and 7.5-minute maps. Site inventory records and project maps showing site locations are included in the technical report (ERT Cultural Resources Technical Report 1980).

Previous work in the area was reviewed. Project reports and site records were obtained from the Museum site files and from the Battle Mountain District of the BLM.

West Smoky Valley Alternative Corridor

The alternative transmission line corridor separates from the proposed corridor south of Round Mountain and generally parallels Route 376 north for a total length of 60 miles. Since no portion of the alternative route was staked, it was only possible to conduct a cultural resources survey for the segment which directly paralleled Route 376. For portions of the route parallel to the road, the corridor width for the project planning purposes was considered 500 feet either side of the highway; for other segments, it was considered 120 feet. Since BLM requested that a Class II (reconnaissance) survey be performed for the alternative, 100 feet either side of Route 376 were surveyed. Total acreage covered for the alternative route was 2,919 or 19 percent of the total alternative route area (7,653 acres).

APPENDIX D

METHODOLOGY FOR VISUAL RESOURCES ANALYSIS

The Bureau of Land Management's Visual Resource Management System was applied to the project area to identify Visual Resource Management Classes and visual impacts caused by the Proposed Action and Alternatives, and appropriate mitigation measures. The accompanying flow diagram (Figure D-1) describes the procedure used in this study. Detailed worksheets and supporting information can be found in the ERT Visual Resource Technical Report (1980).

A summary of visual impacts of the proposed transmission line, West Smoky Valley alternative and alternative structure designs is presented in Figure D-2 thru D-6.

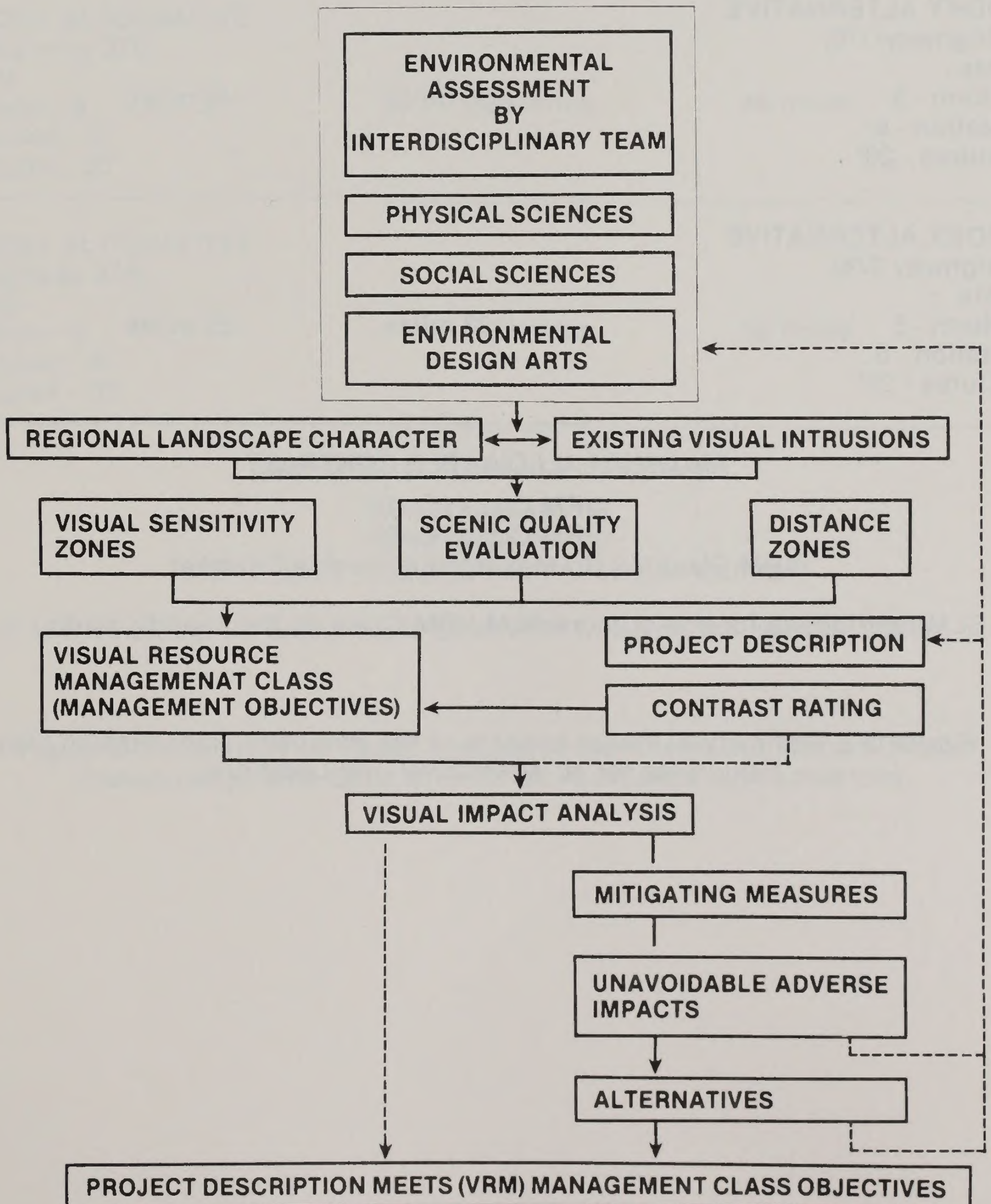


Figure D-1 Flow Diagram of Visual Resources Methodology

	VRM Class III	VRM Class IV	VRM Class V
Proposed Corridor Contrasts Landform - 5 Vegetation - 6 Structures - 20[1]		80 miles	6 miles
WEST SMOKY ALTERNATIVE (West of Highway 376) Contrasts Landform - 8 Vegetation - 6 Structures - 20[1]	36 miles	48 miles	7 miles
WEST SMOKY ALTERNATIVE (East of Highway 376) Contrasts Landform - 5 Vegetation - 6 Structures - 20[1]	23 miles	55 miles	13 miles

MAXIMUM ALLOWABLE CONTRAST

VRM Class III - 16
VRM Class IV - 20
VRM Class V - No Maximum Allowable Contrast

[1]Exceeds BLM restrictions for one or more BLM VRM Class on the specific route.

Figure D-2. Summary of Visual Impacts of the Proposed Transmission Line Structures for all Alternative Line Locations.

	VRM Class III	VRM Class IV	VRM Class V
Proposed Corridor Contrasts Landform - 5 Vegetation - 6 Structures - 20[1]		80 miles	6 miles
WEST SMOKY ALTERNATIVE (West of Highway 376) Contrasts Landform - 8 Vegetation - 6 Structures - 20[1]	36 miles	48 miles	7 miles
WEST SMOKY ALTERNATIVE (East of Highway 376) Contrasts Landform - 5 Vegetation - 6 Structures - 20[1]	23 miles	55 miles	13 miles

MAXIMUM ALLOWABLE CONTRAST

VRM Class III - 16
VRM Class IV - 20
VRM Class V - No Maximum Allowable Contrast

[1]Exceeds BLM restrictions for one or more BLM VRM Class on the specific route.

Figure D-3. Summary of Visual Impacts of the Alternative Wood K-Frame Transmission Line Structures for all Alternative Line Locations.

	VRM Class III	VRM Class IV	VRM Class V
Proposed Corridor Contrasts Landform - 5 Vegetation - 6 Structures - 14		80 miles	6 miles
WEST SMOKY ALTERNATIVE (West of Highway 376) Contrasts Landform - 8 Vegetation - 6 Structures - 20[1]	36 miles	48 miles	7 miles
WEST SMOKY ALTERNATIVE (East of Highway 376) Contrasts Landform - 5 Vegetation - 6 Structures - 16	23 miles	55 miles	13 miles

MAXIMUM ALLOWABLE CONTRAST

VRM Class III - 16
VRM Class IV - 20
VRM Class V - No Maximum Allowable Contrast

[1]Exceeds BLM restrictions for one or more BLM VRM Class on the specific route.

Figure D-4. Summary of Visual Impacts of the Alternate Aluminum Guyed Delta and 4-legged Free Standing Tangent Transmission Line Structures for all Alternate Line Locations.

	VRM Class III	VRM Class IV	VRM Class V
Proposed Corridor Contrasts Landform - 5 Vegetation - 6 Structures - 14		80 miles	6 miles
WEST SMOKY ALTERNATIVE (West of Highway 376) Contrasts Landform - 8 Vegetation - 6 Structures - 20[1]	36 miles	48 miles	7 miles
WEST SMOKY ALTERNATIVE (East of Highway 376) Contrasts Landform - 5 Vegetation - 6 Structures - 16	23 miles	55 miles	13 miles

MAXIMUM ALLOWABLE CONTRAST

VRM Class III - 16
VRM Class IV - 20
VRM Class V - No Maximum Allowable Contrast

[1]Exceeds BLM restrictions for one or more BLM VRM Class on the specific route.

Figure D-5. Summary of Visual Impacts of the Alternate Concrete H-Frame Tangent Transmission Line Structures for All Alternate Line Locations.

	VRM Class III	VRM Class IV	VRM Class V
Proposed Corridor Contrasts Landform - 5 Vegetation - 6 Structures - 14		80 miles	6 miles
WEST SMOKY ALTERNATIVE (West of Highway 376) Contrasts Landform - 8 Vegetation - 6 Structures - 20[1]	36 miles	48 miles	7 miles
WEST SMOKY ALTERNATIVE (East of Highway 376) Contrasts Landform - 5 Vegetation - 6 Structures - 16	23 miles	55 miles	13 miles

MAXIMUM ALLOWABLE CONTRAST

VRM Class III - 16
VRM Class IV - 20
VRM Class V - No Maximum Allowable Contrast

[1]Exceeds BLM restrictions for one or more BLM VRM Class on the specific route.

Figure D-6. Summary of Visual Impacts of the Alternate Steel H-Frame Transmission Line Structures for all Alternate Line Locations.

APPENDIX E

SUMMARY OF AIR QUALITY MODELING

The impact of the proposed development on the ambient air quality of the region surrounding the project was assessed through air quality modeling. The Gaussian-plume based model, Environmental Research and Technology Air Quality (ERTAQ), was used in the analysis. ERTAQ was originally developed for the Environmental Protection Agency (EPA), and has been used extensively throughout the west for impact analysis of mining developments. The model is very similar to the EPA's Climatological Dispersion Model (CDM). The primary differences between ERTAQ and CDM are ERTAQ's ability to characterize line sources and different treatment for area sources.

ERTAQ was modified to incorporate a treatment for particle deposition. To utilize this option, it is necessary to have detailed information on the particle size distribution of each source. Since such information was not available for the Anaconda project, the deposition function was not used in the evaluation. The particulate emissions were assumed to behave as a gaseous pollutant. The effect of such an assumption is the overprediction of concentrations. In general, model predictions are estimated to be accurate to within a factor of two.

ERTAQ was used to calculate both annual and 24-hour maximum concentrations. For the annual case, a stability wind rose developed from data taken at the Nye County Airport was used to characterize the meteorology. However, to establish maximum 24-hour concentration, it was necessary to first determine the meteorological conditions which are expected to produce the highest concentrations. This was accomplished by examining the site-specific data.

APPENDIX F

ASSUMPTIONS USED IN CALCULATING SOIL EROSION LOSSES

Calculations of soil erosion losses for the revegetation scenarios presented in Chapter 3 required use of many assumptions, since the exact future conditions are, of course, unknown. Specific assumptions for wind and water erosion are explained below. General assumptions used in both sets of calculations were as follows:

- Stumble and Bluewing soils would comprise the soils for reapplication. Both would be stripped to a depth of 12 inches. Stumble soils would be stripped from 1,085 acres and Bluewing from 61.
- The soils in the stockpile would be evenly mixed.
- Assumed 400 pounds per acre herbage production under natural conditions.
- Soil I and K factors are weighted averages.
- Slope lengths for water erosion are weighted averages.
- It was assumed that all exposed areas were flat except for the slopes of the tailings dam and waste disposal areas (assumed 3 to 1 slope).

Wind Erosion

Wind erosion losses were calculated using the wind erosion equation developed by Woodruff and Siddoway (1965).

The equation is Soil Loss = $I'K'C'L'V$,

where: I' = soil erodibility

K' = soil ridge roughness factor

C' = climatic factor = 1.5 (150 for Tonopah, Nevada),

V = vegetation cover variable and

L' = complex function of field width,

"I" values were determined using a weighted average of the following values:

Bluewing - 0-3 inches = 80; 3-12 inches = 40

Stumble - 0-12 inches = 135

"K" values were determined using a weighted average of the following values:

Bluewing - 0.3 inches = 0.24;
3-12 inches = 0.10

Stumble - 0.12 inches = 0.17

For baseline conditions the parameters used were as follows:

- *Stumble Series*
  I - 135; K - 1; C - 1.5; V - 400 lbs;
  L - Infinite
- *Bluewing Series*
  I - 80; K - 1; C - 1.5; V - 400 lbs;
  L - Infinite

Table F-1 summarizes all the values used for each revegetation scenario.

Water Erosion

Water erosion losses were calculated for the slopes of the tailings dam and four waste disposal areas for several revegetation scenarios. Water erosion losses are calculated using the Universal Soil Loss equation (U.S.D.A., Soil Conservation Service 1976a).

The equation is Soil Loss = A = RKLSCP,

where: R = rainfall factor = 15

K = soil erodibility factor

L = slope length factor

S = slope gradient factor

C = cropping management factor

P = erosion control practice factor

K values were calculated as weighted averages using the factors given under wind erosion.

For baseline calculations the factors used in the water erosion equation were:

- *Stumble Series* - R - 15; K - 0.17;
  LS - 0.45; C - 0.20 (25% canopy and 20% cover); P - 1.
- *Bluewing Series* - R - 15; K - 0.24;
  LS - 1.0; C - 0.20 (25% canopy and 20% cover); P - 1.

Specific factors used in each revegetation scenario are listed in Table F-2.

TABLE F-1

SPECIFIC VALUES USED IN WIND EROSION CALCULATIONS FOR THREE REVEGETATION SCENARIOS

Waste Disposal Area	Exposed	Mulched	One-half Revegetation
1 - S of Pit	I - 130; K - 1; C - 1.5; V - 1 (cover); L - 2494 × 1312	I - 130; K - 0.5 C - 1.5; V - 4000 lbs/acre (straw); L - 2494 × 1312	I - 130; K - 1; C - 1.5; V - 200 lbs/acre L - 2494 × 1312
2 - N of Pit	I - 130; K - 1; C - 1.5; V - 1; L - 2021 × 2047	I - 130; K - 0.5; C - 1.5; V - 4000 lbs/acre (straw); L - 2021 × 2047	I - 130; K - 1; C - 1.5; V - 200 lbs/acre L - 2021× 2047
3 - NW of Pit	I - 130; K - 1; C - 1.5; V - 1; L - 4884 × 7128	I - 130; K - 0.5; C - 1.5; V - 4000 lbs/acre (straw); L - 7128 × 4884	I - 130; K - 1; C - 1.5; V - 200 lbs/acre L - 7128 × 4884
4 - SW of Pit	I - 130; K - 1; C - 1.5; V - 1; L - 4092 × 2640	I - 130; K - 0.5; C - 1.5; V - 4000 lbs/acre (straw); L - 4092 × 2640	I - 130; K - 1; C - 1.5; V - 200 lbs/acre L - 4092 × 2640
Materials Storage Yard	I - 130; K - 1; C - 1.5; V - 1; L - 361 × 361	I - 130; K - 0.5; C - 1.5; V - 4000 lbs/acre (straw); L - 361 × 361	I - 130; K - 1; C - 1.5; V - 200 lbs/acre L - 361 × 361
Tailings Dam and Pond	I - 130; K - 1; C - 1.5; V - 1; L - (North Arm) × -3,485 (West Arm) × 9952(South Arm) × 6600	I - 130; K - 0.5; C - 1.5; V - 4000 lbs/acre (straw); L - (North Arm) × -3,485 (West Arm) × 9952 (South Arm) × 6600	I - 130; K - 1; C - 1.5; V - 200 lbs/acre L - (North Arm) × -3,485 (West Arm × 9952 (South Arm) × 6600

Source: ERT EIS Team.

TABLE F-2

SPECIFIC VALUES USED IN WATER EROSION CALCULATIONS FOR THREE REVEGETATION SCENARIOS

Waste Disposal Area	Exposed	Mulched	One-half Revegetation
3 - NW of Pit	R - 15; K - 0.168; LS - 17; C - 1; P - 0.9;	R - 15; K - 0.168; LS - 17; C - .02 (2 tons straw); P - 1.0	R - 15; K - 0.168; LS - 17; C - 0.33; P - 1.0
4 - SW of Pit	R - 15; K - 0.168; LS - 14; - 1; P - 0.9;	R - 15; K - 0.168; LS - 14; C - .02 (2 tons straw);	R - 15; K - 0.168; LS - 14; C - 0.33; P - 1.0
Tailings Dam and Pond	R - 15; K - 0.168; LS - 26; C - 1; P - 0.9;	R - 15; K - 0.168; LS - 26; C - .01 (wood cellulose); P - 1.0	R - 15; K - 0.168; LS - 26; C - 133; P - 1.0

Source: ERT EIS Team.

APPENDIX G

ASSUMPTIONS USED IN NOISE IMPACT ANALYSIS

Methodology

Noise impact assessment involves three basic steps. The first step is to determine baseline noise levels at points in the community where people (and wildlife) could potentially be adversely affected (referred to as noise-sensitive receptors). The second step is to predict noise levels at these noise-sensitive receptors caused by the project during its various stages of development. The third and final step is to evaluate the significance of the absolute and incremental change in noise levels from the project.

Noise impact is judged according to two criteria: (1) the extent that specific, quantitative government laws or regulations are exceeded, and (2) the estimated extent that people or wildlife will be actually adversely affected.

Assumptions Regarding Noise Sources

The following sources of noise are considered to be the major determinants of project (mine/mill complex) operational phase noise at distances of several miles or more.

- *Rock Drilling (Blast Hole Drills)*
  The overall noise emission level for a single rock drill is 98 decibels A-weighted (dBA) at a 50-foot reference distance (U.S. Environmental Protection Agency 1971b, page 26, Table IV). The octave band sound pressure levels for the rock drill (shown in Table G-1) were based upon an interpretation of Figure A-7 of the reference.

- *Electric Shovels*
  Detail concerning the type and size of power shovels was not available for this analysis. In lieu of such data, it was conservatively assumed that the power shovel noise emission would be identical to that of a large diesel-electric haulage truck.

- *Miscellaneous Diesel Equipment*
  A variety of diesel-powered equipment is required at any major mine/mill operation. An assortmant of dozers, front-end loaders, scrapers, and other equipment was assumed. Each piece of equipment was assigned a noise emission at 50 feet of 87 dBA, a conservative value obtained from an interpretation of measured data for such equipment (CERL 1978).

TABLE G-1

OCTAVE BAND SOUND PRESSURE LEVEL (dB) SPECTRA OF THE MAJOR PROJECT NOISE SOURCES[1]

	Octave Band Center Frequency (Hz)									
Noise Source	31.5	63	125	250	500	1000	2000	4000	8000	A-wt
Haulage Trucks	78	85	84	93	90	84	77	72	60	90
Electrica Shovel	78	85	84	93	90	84	77	72	60	90
Dozers, Loaders, and Scrapers	77	87	89	84	84	83	81	77	76	87
Blast Hole Drills	90	103	101	95	95	94	92	88	87	98
Mill: Primary, Secondary, and Tertiary Crushers, etc.	108	105	100	94	91	88	86	84	83	95

[1]Based upon a reference distance of 50 feet.

- *Haul Trucks*
  ERT has conducted noise measurements of large off-road diesel-electric haul trucks at mining operations in New Mexico and Montana. For 100- to 170-ton vehicles on an upgrade, noise levels (reference to 50 feet) ranged from 88 to 90 dBA. On a downgrade, levels ranged 10 to 20 dBA lower. For the 120-ton haul trucks planned for this project, 90 dBA was used as a conservative (upper limit) noise emission value.
- *Mill*
  ERT has conducted noise measurements at several large rock mill complexes (at distances of several thousands of feet and remote from other noise sources). Free field (unobstructed line-of-sight) data from such tests is presented in Table G-1.

APPENDIX H

A SUMMARY OF METHODOLOGIES AND ASSUMPTIONS USED IN CALCULATING SOCIOECONOMIC IMPACTS

Introduction

The following material summarizes the major methodological procedures and assumptions used in the assessment of socioeconomic impacts. The discussions emphasize the specific formulas or relationships used in the analysis. A more detailed presentation of the analysis and documentation of assumptions can be found in the ERT Socioeconomic Technical Report (1980).

Baseline Population

Insufficient data were available to use changes in baseline employment to estimate future population in Nye County in the absence of the Proposed Action. Therefore, historical population data were used to estimate a linear regression equation for Nye County population as a function of time. Data for the period 1950-1979 were used as that period typifies the current long-term, stabilized growth of Nye County. The equation was adjusted so that it produced an estimate of 1979 population equal to that provided by the U.S. Census Bureau. The resulting equation,

$P_t = 3{,}104 + 163(t)$, where

P_t = Nye County population in year t, and

t the year for which population is being estimated, 1950 equal to 1

was used to project baseline population. Tonopah's population was then assumed to be a constant 26.3 percent of the total county population. No estimates of baseline employment were derived.

Employment/Population Effects of the Proposed Action

The assessment of the effects of the Proposed Action on Employment, and thereby population, requires that four separate employment stimuli be considered: (1) the transmission line construction work force, (2) the mine/mill construction work force, (3) the residential construction work force, and (4) the mine/mill operating work force.

The possible effects on employment of the transmission line and residential construction work forces are considered to be short term and minimal with little generation of secondary or indirect employment. Most of the laborers would be expected to be either migrants or parties with permanent residences in other Nevada communities. Few would have families, many would commute to their homes on weekends, and therefore, a large portion of their income would not remain in the local economy to generate indirect employment opportunities. Thus, no major population or employment inputs would be expected as a result of these work forces.

The remaining two groups would definitely have a significant impact on employment and population in the Tonopah area. The methodology used to estimate the effects of these work forces on employment and population employs a series of relationships (different for the operating and permanent work forces) to relate the total change in employment (direct plus indirect) to the average annual project-related employment, the immigration of labor to the total change in employment, the total increase in population to the immigration of labor, and the increase in Nye County and Tonopah populations to the total increase in population.

The relationships used to estimate these changes are listed below:

Construction:

Total Employment Multiplier	1.5 (assume instantaneous adjustment)
Labor Supply	10 percent local
Immigrant Worker Characteristics	1.0 workers per household
	40 percent single-member households, either single or married but without accompanying families
	60 percent married households accompanied by families with an average of 1.6 children per household
Residency	90 percent Tonopah
	5 percent Nye County
	5 percent elsewhere

Permanent:

Total Employment Multiplier	2.5 (70 percent immediate response, 30 percent second period response)
Labor Supply	10 percent local
Immigrant Worker Characteristics	1.2 workers per household
	20 percent single member households
	80 percent married households accompanied by families with an average of 1.6 children per household
Residency	90 percent Tonopah
	5 percent Nye County
	5 percent elsewhere

Land Use Impacts

The assessment of land use impacts is confined to estimating the demands for additional land development associated with increased population levels. The effects on land use were estimated by assuming that a standard increment of 12.67 acres of land would be needed to accommodate various needs, e.g., housing and recreation, for each 100 additional persons. The same standardized increment was used in the baseline and future with the Proposed Action scenarios.

Baseline Housing

Baseline housing needs were derived by assuming that one additional dwelling unit would be needed for each additional 2.8 persons expected under the baseline. The allocation between Tonopah and Nye County was done on the same basis as population, i.e., 26.3 percent in Tonopah, the remainder elsewhere. The mix of new housing was assumed to be: 45 percent mobile homes, 12 percent multi-family dwellings, and 43 percent single-family dwellings. No vacancies were assumed in the analysis, as was no factor for replacement or upgrading of the existing housing stock.

Housing Needs With the Proposed Action

Housing needs with the Proposed Action were estimated on the premise that one unit would be needed for each immigrant household derived in the employment/population analysis above. The assumed housing mix for the project-related needs are:

Construction:

- 20 percent single-family dwellings,
- 15 percent multi-family dwellings,
- 40 percent mobile homes, and
- 25 percent in "other", e.g., travel trailers, motels, etc.

Permanent:

- 35 percent single-family dwellings,
- 15 percent multi-family dwellings, and
- 50 percent mobile homes.

School Enrollment

The estimation of baseline school enrollments assumes that recent enrollment trends will continue throughout the baseline period. The relationships used to define the baseline enrollment are:

- Total school district enrollment will be a constant 21.5 percent of total population.
- Enrollments in the Tonopah enrollment area will remain constant at 28 percent of the total district enrollment levels.
- Secondary enrollment (grades 7-12) in Tonopah will account for a constant 53 percent of total Tonopah enrollment.

The projected increases in enrollment associated with the Proposed Action are calculated in a similar fashion. The specific ratios used are:

- Each construction-related immigrant in-

creases local school system enrollment by .22 students.

- Each operations-related immigrant increases local school system enrollments by .27 students.
- The allocation between secondary and elementary students is .3 and .7, respectively, for the construction-related increases, and .4 and .6, respectively, for the operations-related increases.

The effects of the Proposed Action on school enrollments are only estimated through 1985. Projections beyond that point are tenuous at best due to the lack of specific data on the likely composition of the school age population. As the district receives more current information from actual enrollment counts, it will be in a position to prepare more reliable enrollment estimates and assess its staffing and facility needs.

Transportation

The transportation analysis focuses on the relationship between estimated peak-hour traffic volumes and estimated hourly capacity for the major highway segments around Tonopah. Peak-hour traffic estimates were derived for peak traffic hours expected to occur during the construction and employment phases. Two periods were used for the construction period, i.e., one shift, and three periods were used for the operations period, i.e., three shifts. The resulting volume and capacity estimates were again compared, using the same criteria to assess whether there would be a change in the quality of service resulting from the implementation of the Proposed action.

Local Government and School District Finances

As discussed in Chapters 2 and 3, the Nevada State Legislature recently adopted legislation which places limit upon the expenditures of local governments and school districts, increases therein, and the combined unit taxing rate for all overlapping taxing units, e.g., the county and school districts. The law established base values for expenditures, formulas for calculating allowable increases or necessary decreases from that base, and fixed the combined unit taxing rate at $3.64/$100 of assessed valuation (Nevada State Tax Commission 1979).

A reprint of that law and the computation worksheets used to calculate changes in the expenditures ceilings are provided in the ERT Socioeconomics Technical Report (1980). A detailed analysis of the law, or its financial implications, was not performed. Rather, the material was provided so that the reader could become acquainted with the law and how it could possibly affect the financial resources of Nye County, the town of Tonopah, and the Nye County School District.

APPENDIX I

HOUSING ANALYSIS METHODOLOGY

Anaconda Housing Plans

Anaconda has acquired approximately 600 acres of land directly northwest of the existing community of Tonopah. A conceptual master plan has been drafted which provides for residential, commercial, transportation, public, and recreational uses on the site in the following amounts:

Parks, greenbelts, common areas, and future public facilities	120 acres
"Double-wide" modular home park	150 lots
Condominium or apartment land	300 units
Single-family home subdivision	250 lots
Future residential development	300 units
Commercial and streets	Not quantified

To date, Anaconda has received tentative approval for the master plan and the subdivision plan from Nye County and "various state agencies". Construction has begun on a 76-unit apartment - motel, a contract has been let to develop the 150-lot modular home park, and contracts are being negotiated for the construction of a 50-unit apartment/condominium complex.

For purposes of the housing analysis the following assumptions were made regarding the Anaconda housing development:

1) The 76-unit apartment - motel would be completed on schedule for April 1980 occupancy.
2) The 150-lot modular home park would be developed on schedule - with utilities to each lot and pads constructed - ready for units by May 1980. However, since no actual units have been committed, none were assumed to be in place during 1980.
3) The 50-unit apartment/condominium complex would be completed on schedule for July 1980 occupancy.
4) The 250-lot single-family subdivision would be developed on schedule - with utilities and streets to each lot - ready for construction of homes to begin by April 1980. However, since no construction has been committed, no homes were assumed to be in place during 1980 above and beyond the average home construction levels in Nye County in recent years (see below for amplification).

These are considered to be conservative, worst-case assumptions.

Nye County Housing Supply Methodology

For purposes of analysis, it was assumed that the supply capacity of the Nye County housing industry would continue at a level approximately equal to the average annual production of housing in the county from 1970 to 1979. This level was estimated by dividing the average-annual population change for the period by 2.8, the average number of persons per household in Nye County in 1970:

$$\left(\frac{Pop_{79} - Pop_{70}}{9}\right) \div 2.8 \text{ persons}/_{H} = S_{H(70\text{-}79)}$$

where: Pop_{79} = Nye County estimated population in 1979

Pop_{70} = Nye County population in 1970

$S_{H(70\text{-}79)}$ = Average annual supply of housing units for the 1970-79 period.

H = Housing units

The results were as follows:

$$\left(\frac{7{,}994 - 5{,}599}{9}\right) \div 2.8 \text{ persons/H}$$

$$= 95 \text{ H/year (70-79)}$$

APPENDIX J

POTENTIAL MITIGATION MEASURES

Various potential mitigation measures were identified in the environmental statement process. These mitigation measures are not legally enforceable and could not be included in Chapter 1 (Proposed Action and Alternatives) or Chapter 3 (Environmental Consequences). However, these mitigation measures, if implemented by appropriate firms or city and county agencies, would reduce significant impacts reported in the Environmental Consequences chapter.

Each potential mitigation measure is identified along with a general discussion of impacts that would be mitigated.

1. *Cultural Resources for Mine/Mill Complex*
   Although the mine/mill complex was surveyed and identified cultural resources sites collected, it is possible that some cultural resources may have been overlooked. If during the course of construction activity, significant archeological values should be encountered, appropriate archeological agencies (Nevada State Museum Archeological Services or the Nevada Division of Archeology and Historical Preservation) should be notified immediately.

2. *Protection of Blue Jack and Liberty Mine*
   Appropriate mitigative measures to protect or discourage degradation of the Blue Jack and Liberty mines, which are located on private lands outside the project area, should be considered by city or county agencies and local historical groups.

3. *Housing*
   Several possible courses of action are open to Anaconda which would, if implemented, reduce the housing impact associated with the project. For example, contracting for modular home units for the housing development site would reduce the worst-case impact estimate by 150 units; contracting or actual construction of homes in the single-family subdivision would reduce the worst-case estimate by up to 250 units; and constructing a temporary camper/mobile home park at the mine/mill site would reduce the peak construction housing impact since many such workers travel with their own mobile housing units.

4. *Soils at Mine/Mill Complex*
   As discussed in Chapter 3, there is some uncertainty regarding the potential success of the eventual revegetation program. It appears that plans for soil salvage operations would not result in stockpiling of sufficient soil materials to assure sufficient water-holding capacity in the areas to be reclaimed. Unless the materials in the waste rock areas and tailings possess good water-holding capacity themselves, the 6 inches of Stumble soil materials available for reapplication would not possess adequate water-holding capacity to sustain plant growth. This problem could be mitigated by stripping and salvaging additional soil material so that at least 18 inches of soil could be reapplied to disturbed areas. Based on the soil descriptions in Chapter 2, the best soil material for reapplication is the Koyen series, because of its inherently high water-holding capacity.

CHAPTER 7

GLOSSARY

ACRE-FOOT
The amount of water necessary to cover one acre to a depth of one foot, equaling 43,560 cubic feet

AFFECTING
Will or may have an effect on

ALLUVIAL FAN
A low, outspread, relatively flat to gently sloping mass of loose rock material, shaped like an open fan, deposited by a stream at the place where it issues from a narrow canyon or wash onto a plain or valley

ALLUVIUM
A general term for unconsolidated detrital material deposited during comparatively recent geologic time by a stream or other body of running water as a sediment in the bed of a stream or its flood plain, or as a cone fan at the base of a mountain slope

ANIMAL UNIT MONTH (AUM)
The amount of forage required to sustain the equivalent of one cow and calf (1,000 lbs), one horse, one elk, five sheep, five goats, five deer, or five antelope for one month

APRON
Outwash plain, a broad, outspread flat or gently sloping alluvial deposit of outwash in front of or beyond the terminal moraine of a glacier

AQUIFER
A permeable body of rock capable of yielding quantities of groundwater to wells and springs

CONTRAST RATING
A method of determining the extent of visual impact for an existing or proposed activity that will modify any landscape feature (land and water form, vegetation, and structures)

CORONA EFFECT
The ionization of the air immediately surrounding high voltage transmission lines

CUMULATIVE IMPACT
The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

DECIBEL (dB)
A unit for expressing the relative intensity of sounds on a scale from zero for the average least perceptible sound to about 130 for the average pain level

DECIBELS A-WEIGHTED (dBA)
Decibels which are weighted to achieve close approximation to the human hearing spectrum

DIURNAL [meteor]
Pertaining to meteorological actions which are completed within 24 hours and which recur every 24 hours

EFFECTIVE PEAK GROUND ACCELERATION (EPA)
Horizontal ground movement associated with a seismic event and measured as a function of g (gravity = 32 feet/second/second)

EPHEMERAL STREAM
A stream that flows only briefly during and following a period of rainfall in the immediate vicinity

EROSION
The wearing away of the land surface by running water, wind, ice, or other geological agents

FORM
The mass or shape of an object or objects which appear unified, such as in the shape of the land surface or patterns placed on the landscape

FUGITIVE DUST
Any dust particles which become airborne other than those being emitted by a stack or chimney

IMPACT
The results of an action on the environment; the impact may be primary (direct) or secondary (indirect)

IONIZATION
A process by which a neutral atom or

molecule loses or gains electrons, thereby acquiring a net charge and becoming an ion.

LANDSCAPE CHARACTER
The arrangement of a particular landscape as formed by the variety and intensity of the landscape features and the four basic elements of form, line, color, and texture. These factors give the area a distinctive quality which distinguishes it from its immediate surroundings.

LANDSCAPE FEATURES
The land and water form, vegetation, and structures which compose the characteristic landscape

LEAD AGENCY
The agency preparing or having taken primary responsibility for preparing the environmental impact statement

LINE
The path, real or imagined, that the eye follows when perceiving abrupt differences in form, color, or texture. Within landscapes, lines may be found as ridges, skylines, structures, changes in vegetative types, or individual trees and branches.

LOAM
Soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand

MANAGEMENT ACTIVITY
An activity of man placed or undertaken on the landscape for the purpose of harvesting, traversing, transporting, protecting, changing, replenishing, or otherwise using natural resources

MITIGATION Includes:

a. Avoiding the impact altogether by not taking a certain action or part of an action.
b. Minimizing impacts by limiting the degree or magnitude of the action and its implementation.
c. Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.

NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS)
Concentration limits for a variety of air pollutants in outside air, mandated by the Clean Air Act, enforced by the Environmental Protection Agency, and designed to protect public health (primary standards) and welfare (secondary standards)

OVERBURDEN
Material of any nature, consolidated or unconsolidated that overlies a deposit of useful materials, ores, or coal

OZONE
A triatomic form of oxygen that is a bluish irritating gas of pungent odor and a major agent in the formation of smogs

PARTICULATES
Fine solid particles which remain individually dispersed in gases and stack emissions

PELLICULAR LAYER
A film (generally of water) more than one or two molecules thick that adheres to the surfaces of soil and rock particles in the zone of aeration.

PERENNIAL STREAM
A stream that flows continuously during all seasons of the year

PERMEABILITY
The measure of the capacity for transmitting a fluid through the substance

pH VALUE, SOIL
The degree of acidity (or alkalinity) of a soil

PLEISTOCENE
An epoch of geologic time of the Quaternary period, following the Tertiary and before the Holocene; also known as Ice Age

PREDATOR
An animal that preys on other animals as a source of food

PREVENTION OF SIGNIFICANT DETERIORATION (PSD)
Regulations mandated by the Clean Air Act and designed to prevent significant deterioration of existing air quality (not related to health) through three concentration limit categories: Class I - essentially no deterioration, Class II - minimal deterioration, Class III - the maximum allowed deterioration but still less than the NAAQS

RAPTOR
A bird of prey, such as an eagle or hawk

SANDBLASTING
Abrasion caused by the action of hard, windblown mineral grains

SCENARIO
An account or synopsis of a projected course of action or events; as used in impact analysis, refers to a hypothetical situation in which certain assumptions have been made to make the identification of potential impacts possible

SCENIC QUALITY CLASS
The value (A, B, or C) assigned a scenic quality rating unit by applying the scenic quality evaluation key factors which indicate the relative visual importance of the unit to the other units within the physiographic region in which it is located

SCENIC QUALITY RATING UNIT
A portion of the landscape which displays primarily homogenous visual characteristics of the basic landscape features (land and water form, vegetation, and structures) which separate it from the surrounding landscape

SCOPE
The range of actions, alternatives, and impacts to be considered in an environmental impact statement

SEDIMENT
Solid, clastic material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by water, wind, or ice and has come to rest on earth's surface, either above or below sea level

SEDIMENTARY ROCK
A rock formed by consolidated sediment deposited in layers

SEISMICITY
The phenomena of earth movements

SEMI-AUTOGENOUS GRINDING
A secondary crushing system in which the ore is tumbled in a self-grinding process as opposed to conventional rod and ball mill operations

SIGNIFICANTLY
As used in National Environmental Policy Act (NEPA), requires considerations of both context and intensity. Context means that the significance of an action must be analyzed in several contexts such as society as a whole, the affected region, the affected interests, and the locality. Intensity refers to the severity of the impact and is evaluated through the use of several criteria as discussed in NEPA regulations, Section 1508.27.

SOIL HORIZON
A layer of soil, approximately parallel to the soil surface, with distinct characteristics produced by soil-forming processes

SOLUBLE
Capable of being dissolved

STEPPE CLIMATE
Type of climate in which precipitation, though very slight, is sufficient for growth of short sparse grass

TAILINGS
The refuse material resulting from processing ground ore

TEXTURE
The interplay of light and shadow created by the variation in the surface of an object; the visual result of the tactile surface characteristics

TOTAL SUSPENDED PARTICULATES (TSP)
All pollutants in the air that are in solid form (versus gaseous or liquid form). Most TSP is common dust. NAAQS and PSD increments (or limits) have been established for TSP.

TRANSMISSIVITY
In an aquifer, the rate of flow of water, in gallons per day, through each vertical strip of the aquifer 1 foot wide having a height equal to the thickness of the aquifer and under a unit hydraulic gradient

VISUAL RESOURCE
The land, water, vegetative, animal, and other features that are visible on all lands (scenic values)

VISUAL RESOURCE MANAGEMENT CLASS
The degree of visual change that is acceptable within the characteristic landscape. It is based upon the physical and sociological characteristics of any given homogeneous area and serves as a management objective.

VISUAL RESOURCE MANAGEMENT (VRM)
The planning, design, and implementation of management objectives to provide acceptable levels of visual impacts for all BLM resource management activities

WORST-CASE ANALYSIS
As used in impact analysis, an examination of a situation that is undertaken based on the assumption that adverse effects would be maximal; uncertainty regarding the probability of occurrence and/or a lack of relevant data, which eliminate the possibility of a reasoned choice between alternatives, indicate the need for a worst-case analysis

CHAPTER 8

REFERENCES

The Anaconda Company. 1979. Unpublished water quality analysis of sample tailings solution of Hall Molybdenum pilot plant. The Anaconda Company Mineral Resources Group, Tucson, Arizona.

Alexander, L. October 1979. Secretary-Treasurer, Tonopah Chamber of Commerce. Personal communication.

Baker, A., N. L. Archbold, and W. J. Stohl. 1972. Forecasts for the future - minerals. Nevada Bureau of Mines and Geology Bulletin 82.

Beatley, J. C. 1976. Vascular plants of the Nevada Test Site and central-southern Nevada: ecologic and geographic distributions. Office of Technical Information, Energy Research and Development Administration, Document ID - 26881.

Bechtel Inc. January 1980. Design report, tailings embankment. Prepared for Anaconda Copper Company, Nevada Moly Project, Tonopah, Nevada.

Beko, W. October 1979. District Judge, 5th Judicial District, Nye County. Personal interview.

Boni, J. October 1979. County Roads Superintendent, Nye County. Personal communication.

Boscovitch, D. and J. Jones. October 1979. Office Manager and Superintendent, Tonopah Public Utilities Company. Personal communication.

Brammer, R. L. 1978. Steepslope design and revegetation techniques *In* S. T. Kenney (Ed.), Proceedings: High Altitude Revegetation Workshop No. 3. Colorado State University. Fort Collins, Colorado. 5 pp.

Braun, C. E., T. Britt, and R. O. Wallestad. 1977. Guidelines for maintenance of sage grouse habitats. The Wildlife Society Bulletin 5(3):99-106.

Bresch, B. January 1980. State Sociologist, Nevada State Office, U.S.D.I., Bureau of Land Management. Personal communication.

Brown, L. November 1979. Environmental Coordinator, AMAX Co., Henderson, Colorado. Personal communication.

Butts, K. O. 1973. Life history and habitat requirements of burrowing owls in western Oklahoma. M.S. thesis, Oklahoma State University.

Calspan Corporation. 1975. Development document for effluent limitations guidelines and standards of performance, ore mining and dressing industry.

Carder, B. October 1979. Manager, Nevada Telephone-Telegraph Company. Personal communication.

Computer Sciences Corporation. March 1977. The correlation of peak ground acceleration amplitude with seismic intensity and other physical parameters. Prepared for Nuclear Regulatory Commission.

Construction Engineering Research Laboratory (CERL). 1978. Construction-site noise control cost-benefit estimating procedures. Interim Report N-36.

Cook, C. W., R. N. Hyde, and P. L. Sems. 1974. Revegetation guidelines for surface mined areas. Colorado State University, Range Science Department Science Series No. 16. Fort Collins, Colorado. 70 pp.

Dean, K. C., R. Havens, and M. W. Glantz. 1974. Methods and costs for stabilizing fine-sized mineral wastes. Bureau of Mines Report of Investigations 7896. U.S.D.I. Bureau of Mines. U.S.D.I. Library. Washington, D.C. 26 pp.

Dean, K. C., R. Havens, and E. G. Valdez. 1971. U.S. Bureau of Mines finds many routes to stabilizing mineral wastes. Mining Engineering 23(12); 61-63.

Demetras, A. October 1979. Office Manager, Cal-Gas Company. Personal communication.

Deschamp, J. October 1979. Battle Mountain District, Bureau of Land Management. Personal communication.

Environmental Research and Technology, Inc. (ERT). 1978. An air quality analysis of the Anaconda Nevada Moly Project to support a State of Nevada Air Quality permit application. ERT Document No. P-5404-1, November.

ERT. 1979. Application for permission to construct a new source pursuant to the EPA prevention of significant deterioration regulations for the Nevada Moly mine and mill. ERT Document No. P-5404, March.

ERT. 1980. Air Quality Technical Report. Prepared for Anaconda Copper Company by Environmental Research and Technology, Inc., Fort Collins, Colorado.

ERT. 1980. Cultural Resources Technical Report. Prepared for Anaconda Copper Company by Environmental Research and Technology, Inc., Fort Collins, Colorado.

ERT. 1980. Geology and Groundwater Technical Report. Prepared for Anaconda Copper Company by Environmental Research and Technology, Inc., Fort Collins, Colorado.

ERT. 1980. Noise Technical Report. Prepared for Anaconda Copper Company by Environmental Research and Technology, Inc., Fort Collins, Colorado.

ERT. 1980. Socioeconomics Technical Report. Prepared by Abt Associates, Inc., under contract to ERT for Anaconda Copper Company.

ERT. 1980. Soils Technical Report. Prepared for Anaconda Copper Company by Environmental Research and Technology, Inc., Fort Collins, Colorado.

ERT. 1980. Surface Water Technical Report. Prepared for Anaconda Copper Company by Environmental Research and Technology, Inc., Fort Collins, Colorado.

ERT. 1980. Vegetation Technical Report. Prepared for Anaconda Copper Company by Environmental Research and Technology, Inc., Fort Collins, Colorado.

ERT. 1980. Visual Resources Technical Report. Prepared by Merlyn Paulson under contract to ERT for Anaconda Copper Company, Fort Collins, Colorado.

ERT. 1980. Wildlife Technical Report. Prepared for Anaconda Copper Company by Environmental Research and Technology, Inc., Fort Collins, Colorado.

Friel, A. October 1979. Administrator, Nye General Hospital, Nye County. Personal communication.

Ganzel, R. M. 1976. Report on social and economic conditions, Tonopah EIS. Bureau of Government Research, University of Nevada, Reno.

Garrison, J. 1979. Plant Materials Specialist, Soil Conservaton Service. Personal communication.

Gill, E. October 1979. District 5 Supervisor, Nevada State Highway Department. Personal communication.

Gilman, J. October 1979. Supervisor, Juvenile Probation Department, Nye County. Personal communication.

Gilmer, D. S. and J. M. Wiehe. 1977. Nesting by ferruginous hawks and other raptors on high voltage powerline towers. The Prairie Naturalist 9(1):1-10.

Gilmore, J. and M. Duff. 1975. A growth management case study: Sweetwater County, Wyoming. Denver Research Institute, Colorado.

Gold, R. L. No date. Social impacts of strip mining and other industrializations of coal resources. Institute for Social Research, University of Montana, Missoula.

Hamilton, D. November 1979; January 1980. Nye County Planner. Personal communication.

Herron, G. September 1979; November 1979; February 1980. Non-game Coordinator, Nevada Department of Fish and Game, Reno, Nevada. Personal communication.

Houghton, J. G., C. M. Sakamoto, and R. O. Gifford. 1975. Nevada weather and climate. Nevada Bureau of Mines and Geology, University of Nevada, Reno.

Hunt, C. B. 1974. Natural Regions of the United States and Canada. W. H. Freeman and Company.

Hydro-Search, Inc. July 11, 1975a. Ground-water characteristics of northern Tonopah Flat, Big Smoky Valley, Nevada. Prepared for The Anaconda Company.

Hydro-Search, Inc. April 23, 1975b. Development and testing well R. H. No. 142, Hall Property, Tonopah, Nevada. Prepared for The Anaconda Company.

Institute for Social Science Research. 1974. A comparative case study of the impact of coal development on the way of life of people living in the coal areas of eastern Montana and northeastern Wyoming. University of Montana, Missoula.

Jeffrey, S. October 1979. Fire Chief, Tonopah Fire Department. Personal communication.

Johnson, J. October 1979; January 1980. Superintendent, Nye County School District. Personal communication.

Jordan, A. October 1979. Public Health Nurse, Nye County. Personal communication.

Joseph, J. January 1980. Outdoor Recreation Planner, Bureau of Land Management, Tonopah Resource Area. Personal communication.

Kienholz, E. 1977. Effects of environmental molybdenum levels upon wildlife. pp. 731-738 *In* Molybdenum in the Environment. W. R. Chappell and K. K. Petersen (eds.). Marcel Dekker, Inc., New York.

Kilpatrick, H. M., G. Mullings, F. F. Peterson, E. Naphan, R. E. Eckert, N. R. Ritter, J. McWilliams, D. A. Klebenow. 1978. Conservation plantings for rangeland, windbreaks, wildlife. Soil Conservation Service. Reno, Nevada. 24 pp.

Kleinhampl, F. J. and J. I. Ziony. 1967. Preliminary geologic map of northern Nye County, Nevada. U.S.D.I., U.S. Geological Survey in cooperation with Nevada Bureau of Mines.

Knight, P. October 1979. Nye County District Attorney's Office. Personal communication.

Kuchler, A. W. 1975. Map of the potential natural vegetation of the conterminous United States. Scale 1:3,168,000. American Geo-

graphical Society, New York. Serial Publication No. 36.

Kudner, K. October 1979. Assistant Director, Central Nevada Rural Health Consortium. Personal communication.

Lander, H. N. 1977. Energy related uses of molybdenum. pp. 773-806 *In* Molybdenum in the Environment, Vol. II. W. R. Chappell and K. K. Petersen (eds.). Marcel Dekker, Inc., New York.

Logan, P. October 1979. Chairman, Tonopah Town Advisory Council. Personal communication.

Love, B. October 1979. Social Worker, Nevada State Department of Human Resources. Personal communication.

Ludeke, K. L. 1973. Vegetative stabilization of tailings disposal berms. Mining Congress Journal. 59(1):32-39.

Lugaski, T. February 1980. Ph.D. Candidate, Desert Research Institute, University of Nevada, Reno. Personal communication.

Mason, D. February 1980. Wildlife Biologist, BLM Tonopah Resource Area. Personal communication.

McCurry, W. February 1980. Nevada Division of Environmental Protection. Personal communication.

Michely, D. January 1980. Forestry Technician, Toiyabe Forest District Office, U.S. Forest Service, Tonopah, Nevada. Personal communication.

Miller, D., E. L. Bocker, R. S. Thorsell, and R. R. Olendorff. 1975. Suggested practices for raptor protection on powerlines. Raptor Research Foundation, Inc., Provo, Utah.

Molini, W. A. March 1980. Nevada Department of Wildlife, Reno, Nevada. Personal communication.

National Oceanic and Atmospheric Administration (NOAA). 1973. Earthquake history of the United States. NOAA Environmental Data Service Publication 41-1.

Nevada Department of Highways. 1977. 1977 Annual traffic report - Nevada highways. Carson City, Nevada.

Nevada Tax Commission. 1970-79. Local government red book: ad valorum tax rates, budget summaries for Nevada local governments, fiscal years 1970-71 through 1979-80. Carson City, Nevada.

Nick, J. November 1979. Project Engineer, Anaconda Nevada Moly Project, Anaconda Copper Company. Personal communication.

Nielson, R. F. and H. B. Peterson. 1972. Treatment of mine tailings to promote vegetative stabilization. Agricultural Experiment Station, Utah State University. Logan, Utah. 22 pp.

Nye County School District. 1979. 1979-80 Annual Budget. Tonopah, Nevada. 42 pp.

Nye County School District. No Date. Bond issue information, "Bond Election, November 3, 1979."

Perchetti, M. October 1979. Librarian, Tonopah Public LIbrary. Personal communication.

Perry, J. H. 1963. Chemical Engineers' Handbook. McGraw-Hill, New York. pp. 24-68.

Peterson, M. October 1979. Fixed Base Operator, Nye County Airport. Tonopah, Nevada. Personal communication.

Pillsbury, W. October 1979. Professional Engineer, William F. Pillsbury, Inc. Personal communication.

Rowley, R. October 1979; January 1980. Manager, Tonopah Resource Area, Bureau of Land Management, U.S. Department of the Interior. Personal communication.

Rush, F. E. and C. V. Schroer. 1970. Water resources of Big Smoky Valley, Lander, Nye, and Esmeralda counties, Nevada. Nevada Department of Conservation and Natural Resources, Division of Water Resources, Bulletin No. 41. 84 pp.

Serdoz, R. October 1979. Air Quality Officer, Department of Conservation and Natural Resources, State of Nevada, Carson City. Personal communication.

Sergent, Hauskins and Beckwith Consulting Soil and Foundation Engineers. 1978. Final Report, Phase I Hall Molybdenum Project. The Anaconda Company, Nye County, Nevada.

Siskind, D. E. and C. R. Summers. 1974. Blasting noise standards and instrumentation. Bureau of Mines Environmental Research Program, Technical Progress Report 78.

Slemmons, D. B., J. I. Gimlett, A. E. Jones, R. Greenfelder, and J. Koenig. 1964. Earthquake epicenter map of Nevada. Nevada Bureau of Mines Map 29.

Smith, R. M. 1970. General plan, 1970-1985, Nye County, Nevada. Reno, Nevada.

Sorenson, A. January 1980. Acting Sheriff, Nye County, Tonopah, Nevada. Personal communication.

Sotak, T. October 1979. Assistant to the County Administrator, Nye County. Personal communication.

Stark, C. November 1979. Environmental Coordinator, Moly Corporation, Questa, New Mexico. Personal communication.

Sykes, D. February 1980. District Wildlife Biologist, Bureau of Land Management, Battle Mountain District. Personal communication.

Terrell, S. October 1979. Justice of the Peace. Personal communication.

Thompson, L. S. 1977. Overhead transmission lines: impact on wildlife. Research Report No. 2. Montana Department of Natural Resources and Conservation, Energy Planning Division, Helena.

Tingle, B. October 1979. Trooper, Nevada State Highway Patrol. Personal communication.

Turner, B. February 1980. Nevada Department of Wildlife, Las Vegas, Nevada. Letter to T. Shoemaker, ERT.

U.S. Department of Agriculture (U.S.D.A.), Soil Conservation Service. 1971a. Range seeding *In* Technical Guide, Soil Conservation Service. Reno, Nevada. 2 pp.

U.S.D.A., Soil Conservation Service. 1971b. Tree planting. *In* Technical Guide. Soil Conservation Service. Reno, Nevada. 2 pp.

U.S.D.A., Soil Conservation Service. 1976a. Guidelines for erosion and sediment control in Nevada. Soil Conservation Service. Reno, Nevada. 164 pp.

U.S.D.A., Soil Conservation Service. 1976b. Critical areas planting. *In* Technical Guide. Soil Conservation Service. Bozeman, Montana. 7 pp.

U.S. Department of Commerce, Bureau of the Census. 1970. Census of population. U.S. Government Printing Office, Washington, D.C.

U.S. Department of Commerce, Bureau of the Census. 1979. Special census, 1979, Nye County, Nevada. Personal communication with W. Hurn, Special Censuses Division. Washington, D.C.

U.S. Department of the Interior (U.S.D.I.), Bureau of Land Management. No date, a. Unit resource analysis vegetation overlay. Battle Mountain-Tonopah Resource Area and Eureka Planning Unit, Nevada.

U.S.D.I., Bureau of Land Management. No date, b. Unpublished narrative and maps for the unit resource analysis, Shoshone-Eureka Resource Area and Tonopah Resource Area, Battle Mountain District. Battle Mountain and Tonopah, Nevada.

U.S.D.I., Bureau of Land Management. 1976. Socioeconomic profile - including Eureka, Lander, and Nye Counties, Nevada. Battle Mountain, Nevada.

U.S.D.I., Fish and Wildlife Service. 1979. List of endangered and threatened wildlife and plants. Federal Register 44(12):3636-3654, January 17, 1979. U.S. Fish and Wildlife Service, Washington, D.C.

U.S.D.I., Fish and Wildlife Service. January 1980. Letter form W. Meyer, Acting Regulations Director, Portland, Oregon, to District Manager, Bureau of Land Management, Battle Mountain, Nevada regarding Endangered Species Act responsibilities.

U.S. Environmental Protection Agency (EPA). 1971a. Community noise. Report No. NTID 300.3, Wyle Laboratories.

U.S. Environmental Protection Agency (EPA). 1971b. Noise from construction equipment and operations, building equipment, and home appliances. NTID 300.1.

U.S. Environmental Protection Agency (EPA). 1979. Action handbook: managing growth in the small community. Prepared by Briscoe, Maphis, Murray, and Lamont, Inc. U.S. Government Printing Office, Washington, D.C.

Van Pool, M. October 1979; January 1980. District Supervisor, Sierra Pacific Power Company. Personal communication.

Vokits, W. October 1979; January 1980. Postmaster, U.S. Postal Service, Tonopah, Nevada. Personal communication.

W. A. Wahler and Associates. October 1978. Tailings pond management plan. Carr Fork Project for the Anaconda Company.

Wilkes, R. February 1980. Project Manager, Anaconda Nevada Moly Project, The Anaconda Copper Company. Personal communication.

Wines, J. October 1979. Nye County Sheriff's Department. Personal communication.

Wolfe, J. October 1979. Nye County Search and Rescue. Personal communication.

Woodruff, N. P. and F. H. Siddoway. 1965. A wind erosion equation. Soil Science 29(5):489-608.

Yocom, C., V. Brown, and A. Starbuck. 1958. Wildlife of the intermountain west. Naturegraph Books, Happy Camp, California.

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